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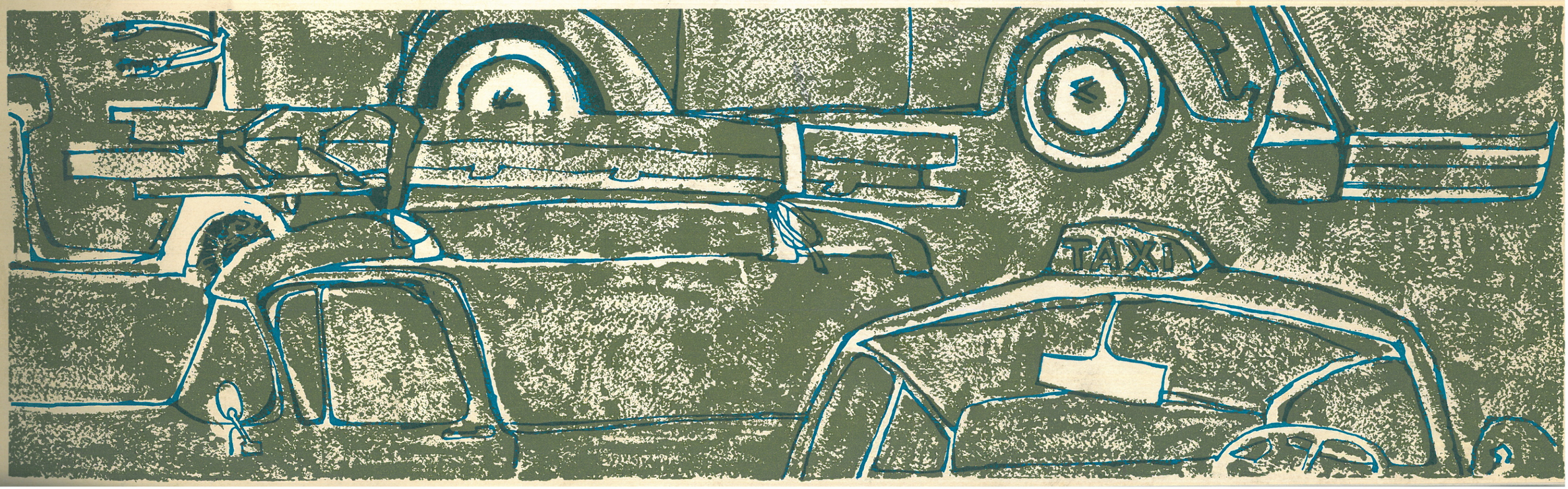
TRAFFICWAYS IN SAN FRANCISCO-A REAPPRAISAL

NOVEMBER 1960



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TRAFFICWAYS IN SAN FRANCISCO-A REAPPRAISAL

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DEPARTMENT OF CITY PLANNING
100 Larkin Street, Civic Center, San Francisco 2, California

City Planning Commission
Mayor George Christopher
Board of Supervisors

Gentlemen:

San Francisco belongs not alone to San Franciscans. To Northern Californians it is "The City," to most North Americans it is the favorite Pacific Coast city, and among world cities, it is universally loved.

But San Francisco is a changing city. As responsible residents we cannot wisely resist the inevitable change. Rather, through our many decisions which affect the growth and development of the city, we must direct the change with sensitivity and respect for what has made San Francisco great while seeking to sustain it in its role of the dominant cultural, business, governmental, and trading center of the Bay Area and of the Pacific Coast.

One of the greatest problems of change in the past fifteen years has been occasioned by the increasing dependence upon the automobile by the increasing number of people attracted to the Bay Area. Dissatisfaction with the freeway building program in San Francisco has made essential a reappraisal of this program — both what has been done in the past fifteen years and what should be done in the next fifteen years.

The report and recommendations submitted herewith are the result of an intensive study made jointly by the Department of City Planning and the Department of Public Works. The cooperation of Mr. Reuben Owens, Director of Public Works, Mr. Clifford Geertz, City Engineer, and the staff members of the Bureau of Engineering is gratefully acknowledged.

It is my hope that the report may be helpful to you who must make the decisions that will control the destiny of San Francisco.

Very truly yours,

James R. McCarthy

James R. McCarthy
Director of Planning

DEPARTMENT OF PUBLIC WORKS
260 City Hall, San Francisco 2, California

Mr. Sherman P. Duckel
Chief Administrative Officer

Dear Mr. Duckel:

I am pleased to submit herewith a report on a reappraisal of San Francisco's trafficways that has been prepared jointly by the Department of City Planning and the Department of Public Works.

The report reviews the many factors that must be considered in deciding whether or not freeways, in addition to those already approved by the Board of Supervisors, are to be built. It demonstrates the inadequacy of the present trafficways and the need for additional freeways in San Francisco and contains a recommended freeway plan for the next fifteen years.

This plan will provide for expeditious travel between the greater part of the city and the downtown and employment areas and between the state and interstate freeways. It is adaptable to expected, though still nebulous, developments. It will, at present prices, cost about $216,000,000 while the property takings will reduce the city's assessed valuation by about one half of one percent.

In conclusion, may I note with appreciation the excellent cooperation between Mr. James R. McCarthy, the Director of Planning, and Mr. Clifford J. Geertz, the City Engineer, and between their staffs, that has resulted in such a comprehensive report.

Very truly yours,

Reuben H. Owens

Reuben H. Owens
Director of Public Works

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A PROGRAM OF FREEWAY DEVELOPMENT

Major Findings, Conclusions & Recommendations

FINDINGS

The volume of motor vehicle traffic on San Francisco's streets and freeways has increased by one-third since 1947. By 1975 the present volume of traffic will increase by one-half.

Three-fourths of the motor vehicle trips on San Francisco streets and freeways both start and end within the city. Less than one per cent are through trips from an outside point of origin to an outside destination. The remaining trips either start or end in San Francisco.

More than one-third of all trips are to or from the Metropolitan Traffic District, including the principal downtown financial, shopping and industrial areas south of Broadway and north of Channel Street which comprise about one-twentieth of the city's area.

The existing street and highway system augmented by the Southern, Embarcadero and Hunters Point Freeways will be unable to accommodate the demands of traffic predicted for 1975.

With only the existing and presently approved freeways in operation, peak hour traffic congestion will continually worsen. If a Bay Area rapid transit system is in operation by 1975 there would still be serious congestion.

Present traffic volumes are in excess of the capacity of many parts of the existing system of streets and freeways. Of the seven major traffic corridors in San Francisco serving different sectors of the city, four do not now have the capacity to meet existing peak hour traffic demand.

The freeways in San Francisco have been found to be more than five times safer to drive on than city streets.

Significant savings in time and vehicle operating costs result from use of freeways, for trips within the city as well as to points outside.

No adverse effect on market values of residential properties adjacent to the James Lick Memorial Freeway occurred because of construction of the freeway.

CONCLUSIONS

Freeways in addition to the presently authorized system will be needed even if a Bay Area rapid transit system is in operation by 1975.

The 1951 Trafficways Plan would provide the best traffic service. Many grave problems of right-of-way acquisition and high project costs stand between this system and a plan which is within the realm of public acceptance.

Not all routes in this plan are essential for inclusion in a plan of projects needed by 1975. The Mission Freeway, the Golden Gate Freeway and a part of the Central Freeway are excluded from the recommended plan.

A Pacific Heights Tunnel or a Presidio Heights Tunnel would provide limited service, and would be incompatible with possible needed future expansion of the total system.

of the Trafficways Reappraisal Survey

RECOMMENDATIONS

It is recommended that a fifteen-year program of development be adopted to add 9.1 miles of freeways to the system of freeways now existing, under construction and authorized in San Francisco. These additions are estimated to cost $216,000,000 at 1960 prices. Assessed value of properties needed to be acquired constitute less than one-half of one per cent of the total assessed value of land and structures in San Francisco.

These recommended projects include:

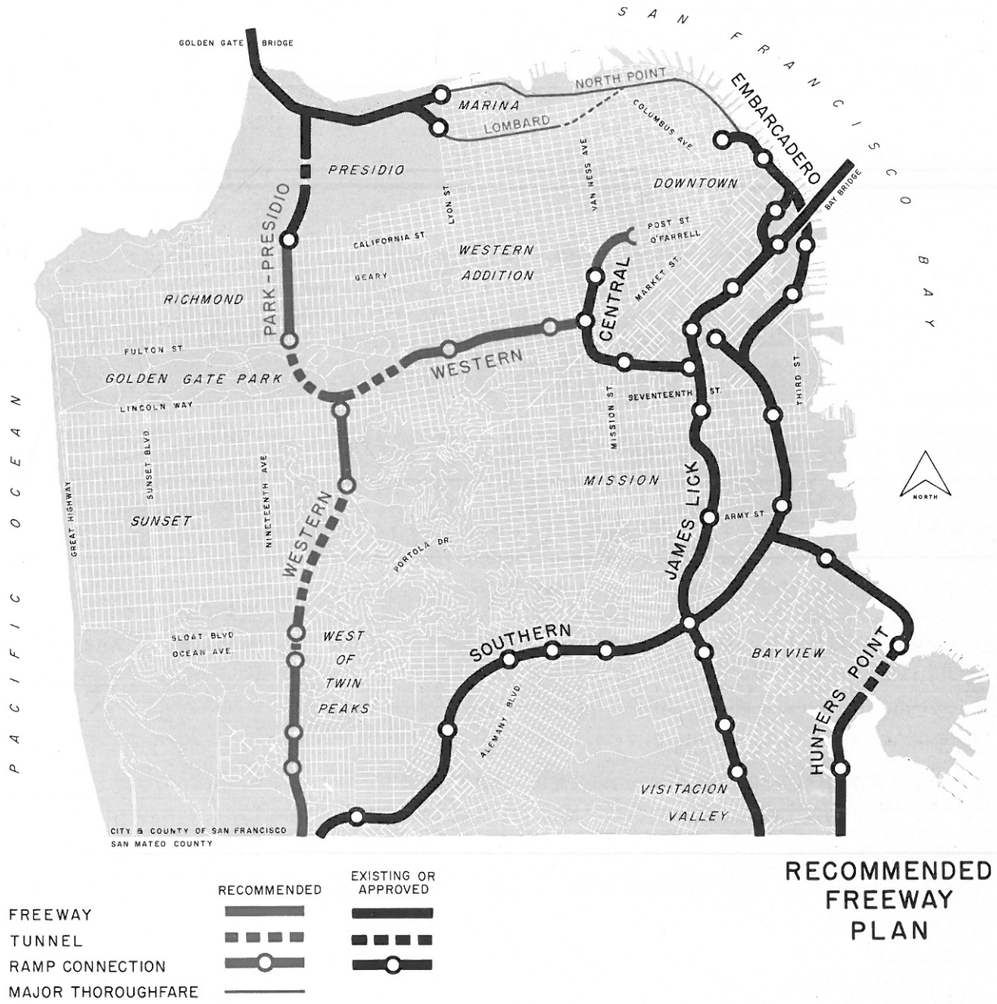
A Modified Western Freeway: Modified from the 1951 Trafficways Plan alignment to provide for extensive tunneling and other design changes to require fewer residential properties; estimated to cost $173,000,000 for 7.1 miles of route.

The Park-Presidio Freeway: Conversion of Park-Presidio Boulevard into a freeway; 0.9 miles long, estimated to cost $2,000,000.

Extension of the Central Freeway: A minimum extension of the existing Central Freeway to ramps at O'Farrell and Post Streets carrying freeway traffic across Van Ness Avenue to provide convenient access to downtown; estimated to cost $9,000,000 for 0.5 miles of route.

The Russian Hill Tunnel: A tunnel (0.6 miles) from North Point Street and Columbus Avenue to Lombard and Franklin Streets to cost $32,000,000, to relieve traffic congestion through the North Beach and Marina districts, with expressway-type improvements on Lombard and North Point Streets. If in later years a freeway were found necessary, it could be integrated with the tunnel.

It is further recommended that, except for the Park-Presidio Freeway route and the Russian Hill Tunnel, consideration of freeway projects to serve the Marina, North Beach, and the Golden Gate Bridge be postponed until decisions have been made on other interrelated factors such as rapid transit to Marin County and an additional Bay crossing to Marin County.



RECOMMENDED FREEWAY PLAN

THE REAPPRAISAL SURVEY

ASSUMPTIONS & METHODS

For several years the Department of City Planning has listed in its annual work program a project to re-evaluate and revise the Trafficways Plan, which is part of the Transportation Section of the Master Plan of San Francisco.

This revision was considered necessary because of:

1. Changes in volumes, flows and patterns of traffic which had occurred since 1951 when the Trafficways Plan was adopted by the City Planning Commission;

2. Development of proposals for local and regional rapid transit which, if adopted, would have an effect upon the vehicular traffic pattern;

3. Changes in land uses in various parts of the city;

4. Changes in the trans-bay bridge situation involving the indefinite postponement of some previously accepted projects and the consideration of new crossing locations and concepts;

5. Experience gained with the actual construction of some of the freeways contained in the Trafficways Plan.

In January 1959 the Board of Supervisors passed a policy resolution declaring its opposition to seven of the freeways contained in the Trafficways Plan and to agreements with the California State Highway Commission for the construction of any of the freeways specified. This resolution gave impetus to a thorough review of the Trafficways Plan.

BASIC ASSUMPTIONS

Fundamental to this reappraisal of the Trafficways Plan have been the basic assumptions described below concerning the role and function of San Francisco as a city and of trafficways as one of the facilities required if San Francisco is to perform its indicated role successfully.

1. *Adequate facilities must be provided for vehicular traffic:* San Francisco is the central core city for a metropolitan area that now has a population of over three and a half million. An increase of this population to approximately five and one-half million persons in fifteen years is predicted, if present growth trends continue. To continue its role as the nerve center and headquarters city for this metropolitan complex, San Francisco must be accessible from all parts of the Bay Area. Without this ready accessibility, its unique functions as the "Capital of the West" will be dispersed. Because of their limited capacity, city streets alone cannot be relied upon to carry the anticipated future flows of vehicular traffic. Long-range plans must be prepared now for the arteries that will be needed in future years. This must be done now so that future land development and use can be related to the trafficways pattern and so that the costly destruction of improvements in the way of such future arteries may be avoided.

2. *Trafficways must be coordinated with planned land uses and public facilities:* The Trafficways Plan must provide a system giving easy access to the city's centers of employment, its shopping areas, the financial district, cultural centers and its residential areas, as well as to the gateways to its neighboring counties. Avenues for the free flow of vehicular traffic should connect major living areas within the city with working areas and areas of commerce. Traffic congestion is costly to both property owners and vehicle owners and must not be allowed to immobilize our citizens and cause them to occupy all their spare time in going about their day-to-day business. The future general plan of city development is set forth in the Land Use Section of the Master Plan, implemented by the recently adopted zoning plan. It would seem to be the way of prudence and logic to develop long-range plans for internal communication to supplement the general blueprint for the future development of the city.

3. *Trafficways should cause a minimum disturbance to established values:* Trafficways should be planned so as to cause a minimum disturbance to private property, neighborhood tranquility and community patterns, even if more costly alternate solutions are necessary. To this end, such trafficway designs as tunnels, vehicular subways, and landscaped parkways have been fully studied and analyzed.

4. *Detrimental effects on the appearance of the city should be avoided:* Particular care must be taken to avoid projects which will have a detrimental effect on the city's appearance. This can be accomplished by careful study and planning, and the use of scale models. In some cases, the most economical design may well prove to be unsuitable.

5. *There must be maximum coordination with planning for all types of public mass transit:* Privately owned automobiles cannot meet all of the city's future transportation needs. A considerable portion of the total needs must be taken care of by the municipally owned surface transit lines and yet-to-be authorized systems of grade-separated rail rapid transit. Where possible, joint rights-of-way should be used for combined transit and trafficways corridors. Trafficway planning in this study has assumed the development of regional rapid transit. The proportion of transit travel, and the consequent reduction in anticipated need for travel by private automobile has been estimated.

PARTICIPATING ORGANIZATIONS

This survey was undertaken jointly by the Department of City Planning and the Department of Public Works of the City and County of San Francisco. It was supervised by

committee of engineers and planners from the two departments. Meetings were held frequently during the study.

Considerable assistance has also been provided by the San Francisco Transportation Technical Committee, the San Francisco Bay Area Rapid Transit District and its consultants, Parsons Brinckerhoff-Tudor-Bechtel, and by the California State Department of Employment and the California State Division of Highways in making data available for the survey, and in some cases in participating in joint surveys to obtain or process certain data or information vital to the findings.

TESTING ALTERNATE TRAFFICWAYS ROUTES

Fundamental to this survey has been the development of several alternate basic networks of trafficways routes and the estimate, by scientifically developed formulas, of the traffic volumes that would be attracted to each of them. This information provided a comparative test of their necessity and their adequacy to handle expected traffic. These alternate networks include a wide variety of possible solutions to the trafficways problem of San Francisco.

Basic data for this study was obtained originally in 1946-47 in a large-scale personal interview survey of daily travel habit patterns conducted jointly by the City, the State and the Federal government. This survey is identified as the "Bay Area Metropolitan Traffic Survey" or "BAMTS." This BAMTS survey was brought up to date in a cooperative project with the consultants of the Bay Area Rapid Transit District who also had basic use for the data. Formulas were utilized reflecting changes in employment, population and motor vehicle registration in each of the 73 traffic zones into which the city was divided. The pattern of daily movements of persons from one part of the city to another by auto and by public transit has been checked against actual counts made of vehicular volumes and transit passenger volumes in 1959 to insure accuracy of the methods employed.

ASSIGNMENTS OF TRAFFIC TO NETWORKS

Knowing what volume of traffic went from one zone of the city to another in 1959 (and by what means and for what purpose), it was then possible to predict how many of these daily travelers would use a freeway in a particular location.

Formulas, tested and in use by the State Division of Highways and the U.S. Bureau of Public Roads, were used based on relative time and distance via freeway and via competitive major streets. Actual experience in tests made of diversion of traffic to freeways in California and elsewhere is reflected in this traffic assignment.

Literally tens of thousands of computations were necessary to add up the over 1,900,000 individual trips from 73 different traffic zones to 72 other zones within the city, trips to and from external points, and traffic volumes from the "choices" made on the basis of the formulas for each trip. The utilization of an electronic computer saved many months of manual computations. The assumptions and the formulas were based on accepted standard operations utilized throughout the nation, and the computer, under constant supervision of trained technicians, did the arithmetic.

OTHER CRITERIA

Many factors other than those involving traffic were considered in arriving at the conclusions set forth in this report. Careful analyses were made also of the relative costs of the alternate networks, the extent to which families and businesses in possible rights-of-way would be displaced and dislocated, the effect on the quality, character and appearance of the city, the relative number of accidents and lives saved, and the effect on the City's tax rolls.

Findings and conclusions were reached jointly by the Department of City Planning and the Department of Public Works after all data had been reviewed and analyzed.

GLOSSARY

FREEWAY *A centrally divided, grade-separated trafficway for uninterrupted flow of traffic, free of cross-traffic, pedestrians and marginal uses, with access only at widely spaced ramps, and no right of access from abutting property.*

EXPRESSWAY *A centrally divided trafficway for continuous movement of traffic which may have access limitations, some street crossings at grade and pedestrian crossings controlled by traffic signals.*

PARKWAY *A trafficway in a park or park-like strip of land with access limitations, from which trucks and commercial vehicles usually are excluded.*

MAJOR THOROUGHFARE *A trafficway designed to carry large volumes of traffic. Abutting property has right of access and local streets cross at grade.*

AVERAGE DAILY TRAFFIC (ADT) *The number of vehicles passing a point in both directions on a week-day for a 24-hour period.*

PEAK HOUR TRAFFIC *The number of vehicles passing a point during the hour of heaviest traffic on a week-day.*

PRACTICAL CAPACITY *The maximum number of vehicles that can be accommodated on a trafficway without unreasonable congestion.*

POSSIBLE CAPACITY *The maximum number of vehicles that can be accommodated on a trafficway regardless of congestion.*

TRIP DESIRE *The prospective desire to make a trip from one zone (origin) to another zone (destination) regardless of route, classified as to mode of transportation.*

TRAFFIC ASSIGNMENT *The assignment of prospective trips between origin and destination zones to a specific route or routes.*

TRAFFIC DEMAND *The estimated amount of traffic that desires to use a trafficway regardless of the capacity available.*

DEFICIENCY *The amount by which traffic demand exceeds the practical capacity of one or more trafficways.*

SURPLUS CAPACITY *The amount by which practical capacity exceeds the traffic demand on one or more trafficways.*

THE CURRENT **TRAFFICWAYS** PROBLEM

On January 23, 1959, as a result of adverse neighborhood reaction to the public presentation of preliminary studies of the Western and Crosstown Freeways, the Board of Supervisors voiced its official opposition to the construction of certain freeways contained in the San Francisco Master Plan by unanimously adopting Resolution No. 45-59 which reads as follows:

"WHEREAS, The State Highway Commission is currently engaged in planning for various freeways; and

"WHEREAS, The construction of such freeways involves the demolition of homes, the destruction of residential areas, the forced uprooting and relocation of individuals, families and business enterprises; and

"WHEREAS, The property taken from the tax rolls will shrink the already restricted taxable area of San Francisco—adding to a marked degree —to the already heavy burden of the taxpayers; now, therefore, be it

"RESOLVED, That the Board of Supervisors of the City and County of San Francisco do hereby declare, as the official policy of said city and county, that it is opposed to the construction of all freeways contained in the San Francisco Master Plan, including the proposed Western Freeway; the entire Junipero Serra Freeway; the entire Park-Presidio Freeway; the Central Freeway from Turk Street to its connection with the Golden Gate Freeway; the entire Golden Gate Freeway from The Embarcadero and Bay Street to the Golden Gate Bridge; the Mission Freeway from Thirteenth Street to its connection with the Southern Freeway, and the Crosstown Freeway, but excepting the Hunters Point Freeway; the Southern Freeway (Orizaba Avenue to the County Line), and the Embarcadero Freeway; and be it

"FURTHER RESOLVED, That the Board of Supervisors opposes the execution of any agreement presented by the State Division of Highways relating to the aforementioned freeways; and be it

"FURTHER RESOLVED, That upon any future notification to the Board of Supervisors by the State Division of Highways, or the Department of Public Works of the City and County of San Francisco, that any other freeway route is proposed in the City and County of San Francisco, the Board of Supervisors will hold complete, individual hearings for the purpose of determining the necessity for and the route of such freeways; and be it

"FURTHER RESOLVED, That copies of this resolution be presented to His Honor, Mayor George Christopher, for transmission to Governor Edmund G. Brown; to the State Highway Commission and to Mr. B. W. Booker, Assistant State Highway Engineer, District IV."

REACTION TO THE RESOLUTION

Some members of the State Legislature, which was in session when the Board resolution was passed, reacted to the resolution negatively, and took issue with the anti-freeway philosophy expressed in it. They also expressed the countering sentiments that existing State highways in San Francisco, such as Nineteenth Avenue and Van Ness Avenue, should be returned to City jurisdiction along with responsibility for their maintenance.

In September, 1958, prior to the Board's resolution, a long-range plan for a comprehensive state-wide system of freeways, expressways, and limited access highways had been drawn up by the State Department of Public Works and recommended for adoption by the Legislature. This report and plan had been requested in 1957 by Senate Concurrent Resolution No. 26. This recommended state-wide system included all of the freeways in the Trafficways Plan of San Francisco which were deleted by the Board in its January 1959 resolution except the Mission Freeway. It also included a Bay crossing from the Tiburon Peninsula in Marin County to the north shore of San Francisco, not shown in the San Francisco Trafficways Plan.

To reflect San Francisco's officially expressed position, the law finally passed by the Legislature to adopt the recommended long-range freeway plan (Senate Bill 480, 1959 Session) did not include the rejected San Francisco routes. This change was accomplished as a result of several conferences held between City officials, members of the San Francisco delegation of the Legislature, members of transportation committees of the Assembly and Senate, and officials of the State Department of Public Works. These negotiations between City and State officials and legislators also resulted in adding the following freeway routes within San Francisco: extension of the Embarcadero Freeway south to Army Street, a northeastern extension of the Southern Freeway to Army Street, and the Hunters Point Freeway. Located in the city's southeastern industrial perimeter, two of these routes had been considered City projects when the Trafficways Plan was first adopted and had been included in the San Francisco Capital Improvement Program. The southern extension of the Embarcadero Freeway had been planned originally as a part of the approach to the Army Street second Bay crossing, but after expiration of legislation authorizing a second Bay crossing to be located at Army Street, it then was assumed that the freeway, if built, would be a City project. Although these three freeways were included in the long-range freeway plan of the State, there is presently a legislative condition that the City must provide the rights-of-way before State funds may be expended on construction.

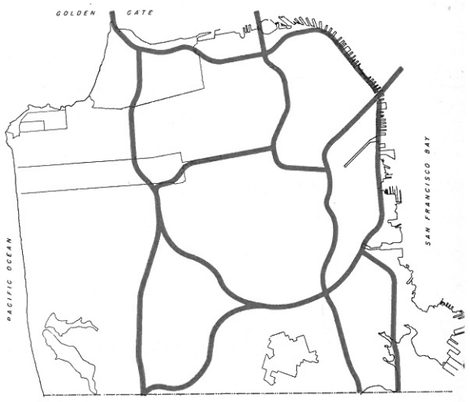
The status of freeways in San Francisco after the passage of the resolution and the State legislation is as follows:

Freeways eliminated:
The Western Freeway (including the Junipero Serra Freeway)
The Park-Presidio Freeway
The Golden Gate Freeway
The Central Freeway
The Mission Freeway
The Crosstown Freeway

Freeways added to State system:
The Southern Freeway Extension
The Embarcadero Freeway Extension
The Hunters Point Freeway

Freeways remaining:
The James Lick Memorial (Bayshore) Freeway, already built
The Central Freeway, sections constructed
The Embarcadero Freeway
The Southern Freeway, sections under construction, budgeted or approved.

STATE FREEWAY SYSTEM



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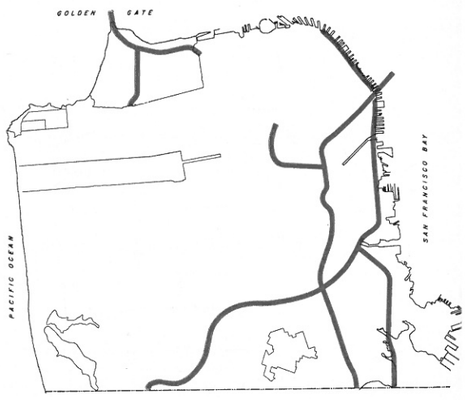


ADOPTED 1959

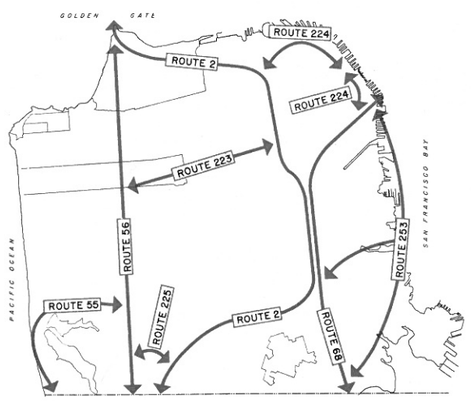
PROBLEMS OF PLANNING AND FINANCING

The freeway resolution of the Board of Supervisors did not close the door on future freeway proposals. Rather, it indicated a disposition of the Board to consider any new plans that might be presented.

However, the immediate result of the freeway resolution was for the State Division of Highways to cease its planning work on the routes rejected within San Francisco. The Director of the State Department of Public Works assured the City that the State would make no further moves without a specific request from the Board of Supervisors.

The status of allocations of the State Highway Budget earmarked for expenditure within San Francisco, in accordance with formulas included in various State laws, became the subject of serious discussion. Would this sum, estimated at $60,000,000, be reallocated to other counties after a reasonable period of time if no plans for freeway construction, except on routes specifically exempted in the freeway resolution, were forthcoming in San Francisco?

At various hearings of the State Highway Commission and of the Assembly Interim Committee on Transportation and Commerce, it was emphasized by legislators and State Public Works officials that they were awaiting a revised Trafficways Plan from San Francisco before they could make any move or come to any decisions on these matters. A special hearing was held on December 8, 1959, by Senator Eugene McAteer of San Francisco to discuss the San Francisco freeway planning problem, and it was concluded that San Francisco must indicate a positive freeway policy before the question of disposition of funds could be answered.



STATE HIGHWAY ROUTES

THE INTERSTATE HIGHWAY SYSTEM

Another problem facing State Public Works officials was the future status of parts of the Federal Interstate Highway System located in San Francisco, essential links of which were deleted from the State freeway system as a result of the Board of Supervisors freeway resolution. These were part of the 40,000-mile system of high-standard grade-separated freeways, authorized in the Federal Highway Act of 1956, for which the Federal government would pay 90 per cent of project costs financed from Federal gas tax and other highway users' taxes. These national highways are designed to provide economical highway routes, separated from local traffic interference, for rapid civilian and military transportation between all parts of the country.

In the San Francisco Bay Area, principal Interstate Highway System projects, built or to be built by the State Department of Public Works, included:

Highway 40 from the San Francisco-Oakland Bay Bridge to Reno and points east;

Highway 50 to Stockton, Reno and points east and connecting with the projected West Side Freeway in the San Joaquin Valley, an Interstate route to Los Angeles;

The Junipero Serra Freeway, a metropolitan by-pass loop, connecting Vallejo, Livermore, and San Jose, and extending up the San Mateo Peninsula in a foothill location to the San Francisco county line at Junipero Serra Boulevard.

Within San Francisco, Interstate routes are:

The Western Freeway from the Junipero Serra Freeway at the county line, to the junction with the Central Freeway near the Civic Center;

The Central Freeway from the Civic Center to the Bay Bridge (already built under the Interstate 90 per cent formula);

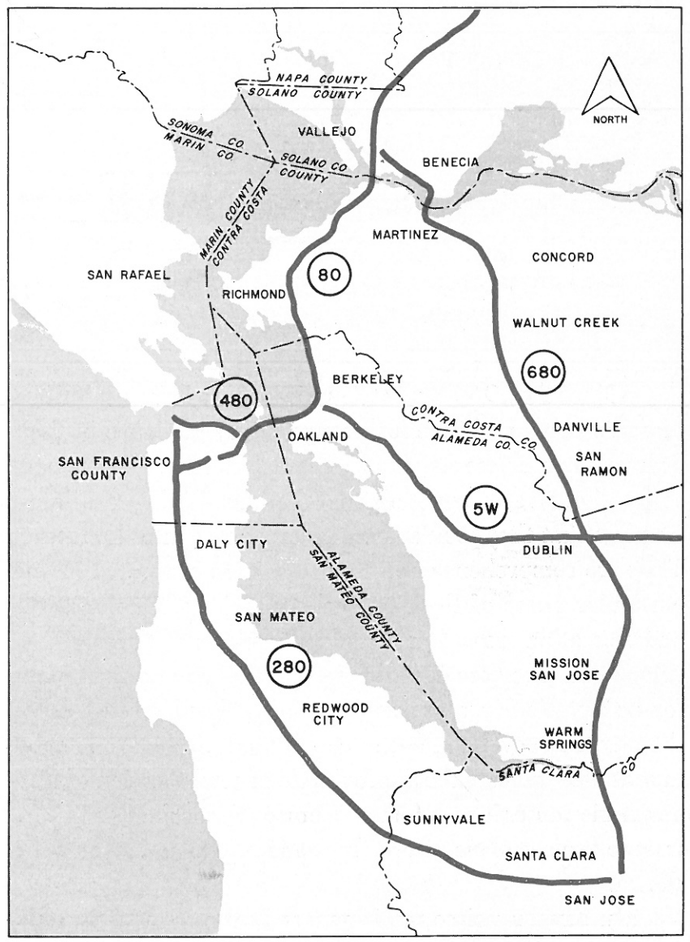
The Embarcadero Freeway from the Bay Bridge to the Golden Gate Freeway (sections already completed were financed under the Interstate formula);

The Golden Gate Freeway from the Embarcadero Freeway to the Golden Gate Bridge;

The Park-Presidio Freeway from the Western Freeway to the Golden Gate Bridge.

The Interstate System within San Francisco was designated to provide continuous connections between the San Francisco-Oakland and Golden Gate bridges, and between the two bridges and the metropolitan by-pass loop at Junipero Serra Freeway and the county line. The deletion of essential elements of this system has raised the question as to whether substitute routes should be developed to insure that national transportation and defense needs are not jeopardized.

Thus, serious problems remain for which solution can be found only through a reappraisal of the Trafficways Plan.



FEDERAL INTERSTATE HIGHWAY ROUTES

THE DEVELOPMENT OF THE FREEWAY SYSTEM

Since the 1940's, most American cities have established Master Plans to provide long-range policy guidance in their development. These are usually characterized as "long-range, comprehensive, city-wide general plans." They are long-range in that they look at least twenty years into the future. They are comprehensive in that they are not limited to one particular phase of the city, such as major streets or parks and recreation areas, but include all aspects of the city's development. They are city-wide in that they are not just plans for one particular community, neighborhood or district of the city, but cover the entire city. Finally, they are general in that they indicate the approximate general location of traffic arteries, transit routes or sites for public buildings in contrast to project plans where precise locations and layouts are shown.

In San Francisco, as is generally the practice in California, the Master Plan is made up of three basic elements, the Land Use Section, the Transportation Section and the Public Facilities Section. The Trafficways Plan is one of the elements of the Transportation Section of the Master Plan.

CHARTER PROVISIONS

Section 116 of the Charter of the City and County makes it the "function and duty of the City Planning Commission to adopt and maintain . . . a comprehensive, long-term general plan for the improvement and future development of the City and County to be known as the Master Plan," to show the general location and extent of public ways, transportation routes, public buildings, open spaces, and general location of the various uses of the land.

Sections 69.1 and 116.1 of the Charter require the development by the Department of City Planning of an annual six-year capital improvement program and give review authority to the City Planning Commission to assure that projects being proposed by all departments and agencies of the City are in conformity with the Master Plan.

San Francisco's Charter provisions concerning its Master Plan differ from those of many cities in that in San Francisco the plan is adopted only by the City Planning Commission. In most counties and cities, the Master Plan is adopted by the Board of Supervisors or City Council upon the recommendation of the Planning Commission; but in San Francisco, the Board of Supervisors is not required to adopt the Master Plan.

THE EFFECT OF THE FREEWAY RESOLUTION

Although all of the rejected freeways named in the freeway resolution of the Board of Supervisors of January 1959 are still on the official Master Plan of the City, the practical effect of the resolution was to amend it by eliminating the listed freeway routes, since the Board stated it would be contrary to its policy to take any action to bring about their construction. The action of the Board did not affect the power of the State Highway Commission and the State Department of Public Works to construct State highways within municipalities, a power possessed since the 1930's. By spelling out its intention not to enter into freeway agreements with the State on the rejected freeway routes, however, the Board set up a practical barrier to State construction of freeways within the city. Without such agreements, the State would not have the authority to close city streets or to alter them for access ramps or local service streets. To build a freeway, the State would be forced to provide a grade separation at every location where a city street is crossed by a freeway. This, of course, would be feasible only under very exceptional circumstances.

These actual barriers to implementation of the Trafficways Plan could have no other result than to make necessary its revision so that its proposed projects were not in conflict with the policies of the Board of Supervisors, but rather were an expression of Board policies.

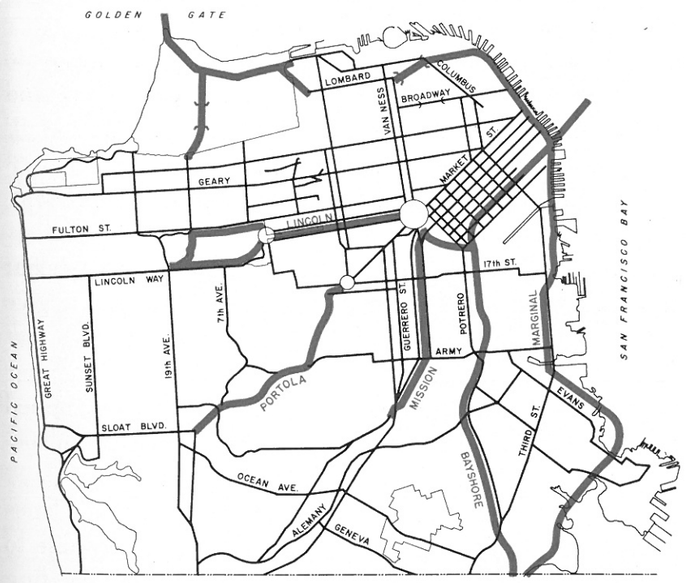
DEVELOPMENT OF THE TRAFFICWAYS PLAN

The Trafficways Plan, adopted by the City Planning Commission in 1951, is the outgrowth of two previously developed plans for high-capacity traffic arteries which were drawn up in the 1940's: *The Major Thoroughfares Plan* of the Transportation and Utilities Section of the Master Plan adopted on December 20, 1945, and *Report to the City Planning Commission on a Transportation Plan for San Francisco* published in 1948 after an extensive and comprehensive survey of traffic and transit problems by the Transportation Technical Committee assisted by planning and engineering consultants.

The 1945 Master Plan was the first long-range, comprehensive plan adopted by the City Planning Commission and included plans for freeways, parkways, rapid transit lines and off-street parking. This plan was, in effect, an interim plan, and one of the basic recommendations contained in the adopted report on the plan was for a more comprehensive survey to be made of the entire transportation problem of the city, including freeways, rapid transit, off-street parking, and coordination of traffic signals. The city was beset with problems of street congestion, downtown parking deficiencies, obsolescence of its surface transit facilities and inadequacy of its traffic control system.

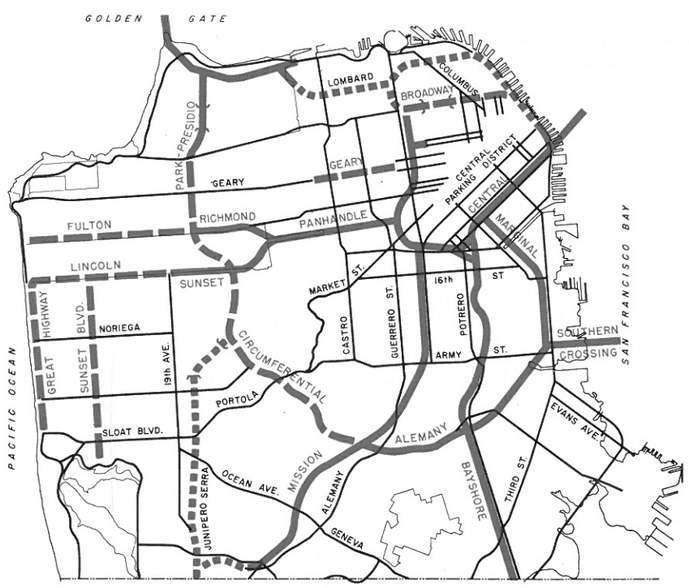
Consequently, at the initiation of the City Planning Commission, the Board of Supervisors in 1947 appropriated $200,000 for a comprehensive transportation survey. A Transportation Technical Committee representing the Department of City Planning, Department of Public Works, Public Utilities Commission, and Police Department was appointed by the Mayor to manage the project. Two consulting firms, DeLeuw, Cather & Company, consulting engineers, and Ladislas Segoe & Associates, consulting city and regional planners, were engaged to assist in the work. Completed in November of 1948, the report resulting from this study recommended a coordinated system of freeways, expressways, parkways, major and secondary thoroughfares; rail line subways, bus subways; a completely modernized program of traffic control, a large-scale program of downtown off-street parking facilities; and a revised city-wide land use plan utilized as a framework for the transportation program.

After approximately two years of study, the City Planning Commission held final public hearings on the proposed Trafficways Plan, an outgrowth of the proposals contained in the 1948 report, and it was formally adopted in March 1951.



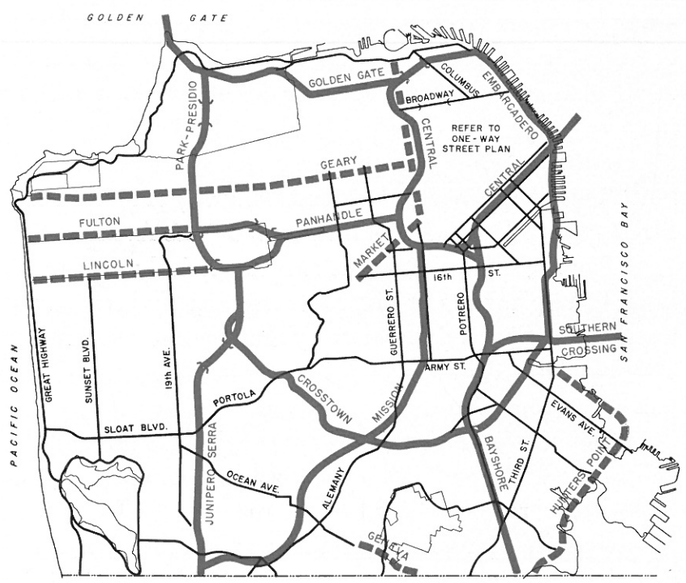
FREEWAY
MAJOR STREET

1945 MAJOR THOROUGHFARES PLAN



FREEWAY - 20 YEAR PROGRAM
EXPRESSWAY - 20 YEAR PROGRAM
EXPRESSWAY - FUTURE
MAJOR THOROUGHFARE

1948 COMPREHENSIVE TRAFFICWAYS PLAN



FREEWAY
EXPRESSWAY
MAJOR THOROUGHFARE

1951 TRAFFICWAYS PLAN

DEVELOPMENT OF THE FREEWAY ROUTES

The 1951 Trafficways Plan contained more mileage of freeways than either the 1945 Major Thoroughfares Plan or the 1948 Transportation Plan report. The 1945 plan was not a complete plan: only the most urgently needed freeway projects were included pending the comprehensive survey. In the 1948 report, a distinction was made between routes on which heavy traffic was predicted within the next decade, which were recommended for freeways, and routes on which heavy traffic was not predicted for ten to twenty years from 1948, which were recommended as expressways.

A Marginal Freeway was an important element of the 1945 plan, to provide a high-capacity artery serving the city's eastern industrial and waterfront districts, as well as the financial district. Starting from Lombard Street and Van Ness Avenue, it tunneled under Russian Hill and followed the present line of the Embarcadero and Hunters Point Freeways to the county line. In the 1948 Transportation Plan report, the Embarcadero Freeway north of the Ferry Building was shown as an expressway, and the part between the Ferry Building and Army Street was considered to be a part of the approach system to the Army Street Southern Crossing. South of Army Street, a new street was shown in the recommended 1948 plan instead of the Hunters Point Expressway later included in the 1951 Trafficways Plan. The Trafficways Plan also restored the original concept of the Marginal Freeway north along The Embarcadero, and along Bay or North Point Street to the Russian Hill tunnel to Van Ness Avenue.

The Bayshore Freeway is shown relatively unchanged in all three plans. Its precise route had already been agreed upon by the City and the State by the time the 1945 Major Thoroughfares Plan was adopted, and was incorporated in it and subsequent plans.

The Mission Freeway has appeared in all three plans, and in the 1945 and 1948 plans was conceived as a joint highway and rapid transit route. In 1945 it extended only to Monterey Boulevard, but in 1948 it was extended southwesterly along the right-of-way of the old Valencia Branch of the Southern Pacific Railway to the county line near Junipero Serra Boulevard. This concept was incorporated in the 1951 Trafficways Plan, although the section southwest of San Jose Avenue and Monterey Boulevard was renamed as part of the Southern Freeway. Because the Mission Freeway north of Monterey Boulevard was not included by the Legislature as part of the State highway or freeway system, however, it had not been considered as an active project for several years prior to the freeway resolution.

The Portola Freeway, included in the 1945 Major Thoroughfares Plan, was subsequently converted into a four-lane major thoroughfare which has been built as the Market-Portola improvement with City funds.

The Lincoln Freeway in the 1945 plan was a short radial route from the Civic Center to Golden Gate Park located between Fell and Oak Streets with two branches: one south to Lincoln Way and Nineteenth Avenue, and another north to Fulton Street and Park-Presidio Boulevard. This concept was incorporated in the 1948 plan as the Panhandle Freeway with Richmond and Sunset branches on either side of Golden Gate Park, and with the exception of the Richmond branch, became a part of the Western Freeway in the 1951 Trafficways Plan.

Freeways in the Western Part of the City. In the 1945 Major Thoroughfares Plan, it will be noted that no freeways were planned for the areas west of Park-Presidio Boulevard and Nineteenth Avenue, and except for the Bayshore and Marginal Freeways, none were planned south of the intersection of San Jose Avenue and Monterey Boulevard. This general pattern was also followed in the 1948 plan where elements later included in the Trafficways Plan were designated as expressways.

In the development of the adopted Trafficways Plan, the decision was made to show as freeways all routes that might become freeways by conversion from expressways.

The availability of additional State Highway Users Funds for State highway system construction authorized in the Collier-Burns Act of 1948 brought the time within the foreseeable future when State highway system routes in the Trafficways Plan might be built.

Thus, the Circumferential Expressway became the Crosstown Freeway, the Junipero Serra Expressway became a part of the Western Freeway and additions such as the Golden Gate Freeway and the Park-Presidio Freeway were made to the system to provide for:

1. Continuous freeway connections between the city's gateways, such as the Golden Gate Bridge, the San Francisco-Oakland Bay Bridge, the proposed Southern Crossing, and Peninsula entrance freeways.
2. A system of radial routes connecting these gateways as well as the city's residential areas with downtown and industrial employment areas.
3. A system of ring roads or circumferential routes to provide crosstown connections to by-pass the downtown and industrial areas and to provide easiest passage through the city of "gateway-to-gateway" external traffic.

PRINCIPLES, OBJECTIVES AND STANDARDS

In addition to providing the pattern of radial, circumferential and inter-gateway routes for the free flow of large volumes of traffic, the Trafficways Plan also contains the following basic planning concepts:

1. The routing of main traffic arteries so that they do not cut through natural community entities, but pass around them, preferably following natural separators where available, such as topographical features.
2. The designing of routes to carry public transit vehicles where possible.
3. The physical separation of opposing lanes of traffic; use of grade separations and use of local service drives to give maximum expressway character to major thoroughfares that are not full freeways.
4. Landscaping and parkway treatment to be applied wherever possible; view points to be provided, and with special parking areas, where appropriate.
5. Freeways to have not more than three traffic lanes in each direction; access ramps to be located at half-mile to one-mile intervals, with proper accelerating and decelerating lanes; widest possible rights-of-way and maximum landscap-

ing to be employed to protect and enhance adjoining properties.

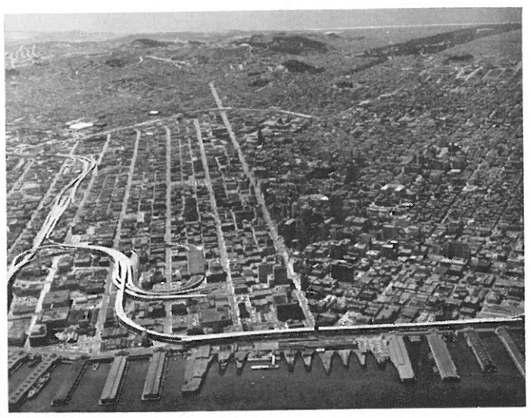
6. Continuous elevated structures to be avoided, except in industrial districts where middle-of-the-block locations were to be followed, or except if the route was part of a bridge approach, or if required by topographical conditions, such as a deep valley between hills. Preferably, freeways were to be on grade, or semi-depressed, or on a semi-elevated fill.

FIRST FREEWAYS CONSTRUCTED

San Francisco's first freeway put into service was the part of the Bayshore (later renamed the James Lick Memorial) Freeway completed between Alemany Boulevard and 24th Street in August of 1951. In rapid succession other parts of the James Lick Memorial Freeway were completed, extending its service to Ninth Street, and then to Fourth Street and the Bay Bridge, and via the Central Freeway, to Mission Street and in 1958 to Golden Gate Avenue and Franklin Street.

It is now possible to drive without encountering a traffic light from Peninsula points to Fell and Laguna Streets, Golden Gate Avenue and Franklin Street, Fourth and Bryant Streets, and Broadway and Battery Street via completed sections of the James Lick, Central and Embarcadero Freeways, each of which has been built along routes indicated in the Trafficways Plan.

SAN FRANCISCO



It was found convenient, in the areas north of Potrero Hill, where parts of the close-in, high-value South of Market industrial district were traversed, to use continuous elevated trestle-type structures. These allow for all cross streets and rail lines to continue uninterrupted on the surface and for economic use of the land spaces under the freeway as parking lots, bus storage yards, truck marshalling yards, and contractors' equipment yards. If other design patterns had been followed, this use would not be possible. Only on 13th Street was an existing street roofed over by the elevated. Elsewhere, mid-block locations between existing streets were followed.

This use of elevated structures, although appropriate for the particular areas traversed, became synonymous with the word "freeway" in the minds of many people, and influenced their attitudes towards freeways proposed through their own community areas.

DESIGN STUDIES STARTED ON OTHER ROUTES

In 1948, by the passage of the Collier-Burns Act, the State gasoline tax was raised to provide additional funds for the elimination of deficiencies in the State highway system. All of the increased receipts were earmarked for construction of needed State highways and freeways, including portions of these systems within San Francisco.

The State Division of Highways soon began preliminary planning studies and surveys for the Western Freeway, Junipero Serra Freeway and Park-Presidio Freeway routes in San Francisco. It became known that, in accordance with the adopted Trafficways Plan, one of the freeways would go through the Golden Gate Park Panhandle and another would cross Golden Gate Park from Seventh Avenue to Park-Presidio Boulevard. Alarm was spread that Golden Gate Park would be irreparably damaged. The possible use of the Panhandle for a freeway right-of-way also created considerable opposition. The Recreation and Park Commission of San Francisco passed a resolution opposing a freeway in the Panhandle and any above-ground crossing of Golden Gate Park. Subsequently the City Planning Commission in 1955 passed an amendment deleting from the Trafficways Plan the portion of the Western Freeway proposed for the Park Panhandle "pending further study."

The possibility of financing the designated Interstate routes in San Francisco with "90 per cent money" from the Federal government stimulated State engineers to initiate preliminary design studies for their planning, whereas previous to passage of the 1956 Federal Highway Act it had been assumed that work on these projects might be many years in the future.

Another stimulant to early design work on these projects was the increased volume of vehicular traffic pouring daily into San Francisco from its neighbor counties, indicating peak hour congestion crises in the not-too-distant future. By 1955 the James Lick Memorial Freeway was carrying approximately twice the volume that had been predicted for 1960 in the 1945 studies. Thus, the engineers felt a sense of urgency that possibly might not have been shared by the San Franciscan who had not yet experienced the unanticipated congestion.

Changed engineering standards were also reflected in this preliminary planning. Where freeways with not more than three traffic lanes in each direction had been considered the desirable maximum in the 1951 Trafficways Plan, the Federal Interstate Highway System standards required sufficient space for four traffic lanes in each direction as well as space for emergency turn-out lanes on either side of each one-way four-lane roadway. Grades had to be less than previously required, design speeds higher, and curves more gradual. In general, the freeways began to take on more the character of engineering structures designed for fast movement of heavy vehicles than the "express parkways" of the late 1930's and 1940's, such as the Arroyo Seco parkway in Los Angeles and the Westchester County and Long Island parkways in New York.

PUBLIC **CONCERN** WITH FREEWAY DEVELOPMENT

When public hearings were held by the City Planning Commission in 1951 on the adoption of the Trafficways Plan, little public concern over the location of any particular project was expressed, as the plan was considered to be generalized and far in the future. It was only when detailed engineering plans were drawn that the public became aware of the effect of a project upon their property, their neighborhood, and the appearance of the city.

THE EMBARCADERO FREEWAY

As far back as 1935 the concept of an elevated express highway along The Embarcadero had been discussed. A similar proposal was included in the Daniel Burnham Plan for San Francisco published in 1905. The Marginal Freeway along The Embarcadero was a keystone in the proposed traffic arteries incorporated in the 1945 Master Plan. The elevated West Side Highway along New York City's Hudson River waterfront provided a successful example.

The 1945 Master Plan proposed an underpass at the Ferry Building to allow for a plaza at the proposed Ferry Building "Water Gate." Elsewhere along The Embarcadero the elevated structure was proposed to go through an industrial and warehouse district where it was not deemed to be detrimental. This concept was carried forward in the 1948 Transportation Plan report and in the adopted 1951 Trafficways Plan. Not long thereafter, the following events developed a problem of the highest magnitude:

1. The State Division of Highways determined that an eight-lane double-deck structure would be necessary between Howard Street and Broadway, on the basis of traffic estimates and right-of-way problems.

2. Steps were taken to redevelop the 18-block area occupied by the wholesale produce market as a new office tower and apartment tower district, to be known as the Golden Gateway, utilizing Federal urban renewal loans and grants.

3. A Ferry Park Plaza was proposed as a State Park in the redevelopment project, but the State Park Commission would not take action because of the anticipated presence of the double-deck freeway.

THE EMBARCADERO FREEWAY

By the time contract bids were ready proposals were advanced to curve the freeway away from the Ferry Building or to construct an underpass in the area of the proposed Ferry Park. These proposals received thorough consideration by City and State officials and were given prominent coverage by the city's press. However, when the Division of Highways determined that the underpass would cost $15,000,000 more than the $9,000,000 elevated structure, a great portion of public support for the below-grade alternate vanished. The Embarcadero Freeway, now in operation, continues to be a source of controversy.

Construction of the Central Freeway as a double-deck structure from Mission Street to Franklin Street was completed in 1958, and gave added weight to a general impression that all future freeways were to be elevated.

THE CENTRAL FREEWAY

THE WESTERN FREEWAY

After the designation of the Western Freeway as a part of the Federal Interstate System of Highways, preliminary planning work for this route was initiated in the District IV office of the State Division of Highways. It appeared that several blocks of improved land north of St. Francis Circle and south of Golden Gate Park would be involved. Alarmed civic leaders formed a group known as the Property Owners' Association to study the problems posed by the freeway.

The Division of Highways was invited to explain its plans at a public meeting sponsored by the civic clubs in the auditorium of Lincoln High School. Hundreds of property owners and interested persons attended. Sufficient factual data on the several possible routes through the area were not available at that time to answer all the questions, and the result was to make many residents of the area fearful that their own property was endangered and that the engineers were secretive about the plans. The concept that a freeway could be built as a below-grade parkway, with frequent overpasses for pedestrians and cross streets, was not effectively demonstrated.

The Property Owners' Association members communicated with civic, neighborhood and merchants' clubs throughout the city on the problems presented by possible freeway projects. There was a spontaneous and immediate response. Merchants in the Polk Street business district between Geary Street and Broadway feared that their district would be destroyed by the proposed Central Freeway. The merchants and property owners in the Marina feared that the Golden Gate Freeway would be a barrier that would cut off one part of their district from the other. The Telegraph Hill Dwellers Association anticipated with distaste an extension of the double-deck elevated Embarcadero Freeway around their high-value, view-conscious hill. The Glen Park property owners group feared that the Crosstown Freeway would liquidate their neighborhood business center at Bosworth and Diamond Streets and destroy part of their residential area.

THE WESTERN FREEWAY SURVEY

As a result of this expression of neighborhood feeling, a survey was authorized by the Board of Supervisors at a cost of $40,000 to determine whether a Western Freeway was necessary, and, if so, to recommend the route it should follow. The firm of Wilbur Smith and Associates, traffic and transit consulting engineers, was engaged for this survey in June of 1957. Traffic counts, origin-destination surveys, and personal interview surveys were made of the city's southwestern quadrant, as well as analyses of present and future land use trends, population trends, and trends of development and traffic potential for northern San Mateo County.

On December 17, 1957, the consultants submitted a report on the *San Francisco Western Freeway, Phase I, Determination of Need*, in which they set forth their analysis of findings and their conclusions that a Western Freeway would be necessary within ten years.

In September of 1958 the second part of the consultants' report, *San Francisco Western Freeway, Phase II, Route Location and Economic Study*, was completed, in which alternate routes for a Western Freeway were analyzed and compared.

The consultants concluded that:

"The need for a Western Freeway is indicated despite the development of a convenient rapid transit service to the downtown area of the type recently recommended to San Francisco, and despite other trafficways improvements which are under construction or planned for other major corridors of traffic movement. The planning of this freeway should be coordinated with the Master Plan for trafficways, with plans for the provision of adequate parking and other terminal facilities, with land use plans and developments, and with other civic plans related to the overall transportation needs of the city."

It was found that existing traffic arteries going through the Western Freeway study area — Seventh Avenue-Laguna Honda Boulevard, Nineteenth Avenue, Sunset Boulevard, and Great Highway — taken together were inadequate for current peak hour traffic. This resulted in a redistribution of traffic to less direct routes, and in a lengthening of the peak period. Two of the most direct north-south routes — Nineteenth Avenue and Seventh Avenue-Laguna Honda Boulevard — were found to be completely inadequate, in that current volume of traffic exceeded practical capacity. This was not true, however, of the two indirect routes, Sunset Boulevard and Great Highway.

The origin and destination surveys indicated that about two-thirds of the vehicular trips had one or both ends of the trip in the study area. Only one-third of the vehicular trips were through the study area with most of them from San Mateo County to other areas in San Francisco. Only four per cent of the total trips had both origin and destination outside of the city.

While San Francisco was expected to increase in population by not more than 10 per cent by 1980, San Mateo County was expected to more than double its population. More automobiles per capita were also expected, both in San Francisco and in San Mateo County.

It was predicted that the traffic entering and leaving San Francisco would almost double by 1980, creating intolerable congestion on the James Lick, Southern, Hunters Point and Embarcadero Extension Freeways which would be in service by that time. The existing major thoroughfares serving the Western Freeway study area would also be intolerably congested. It was estimated that traffic volume demands in 1980, for movements traversing, originating in or ending in the study area, would exceed the practical capacity of the existing routes by about 40 per cent. The consultants concluded that future traffic demands, primarily for trips originating and/or ending in San Francisco, made a Western Freeway essential.

ALTERNATE ROUTES STUDIED

The consultants' contract with the City and County required that four specific routes be studied for a possible Western Freeway:

1. The Trafficways Plan alignment, Alternate A
2. A route near Nineteenth Avenue, Alternate B
3. A route along Sunset Boulevard, Alternate C
4. A route along Great Highway, Alternate D

In their analysis they took into consideration construction costs, right-of-way costs, number of properties and number of dwelling units to be acquired, length of route and comparative driving time from Junipero Serra Boulevard at the county line to the vicinity of Kezar Stadium. Relationship to topography, land use and centers of population, shopping and employment were considered, along with locations of churches, schools, and other institutions. Traffic service to be provided by the alternate routes and the amount of traffic that could be expected to be attracted to them in comparison with their anticipated cost were other important factors considered. For instance, a route that would attract little traffic was considered to be inadequate in that it would not fulfill one of the principal objectives of a Western Freeway, the removal of existing or predicted future traffic congestion from the surface streets of southwestern San Francisco.

The Trafficways Plan Route: Alternate A. Junipero Serra Boulevard was to be converted into a six-lane below-grade divided freeway. From St. Francis Circle north to Santiago Street, however, this route involved taking six blocks of single-family residences between Fourteenth and Fifteenth Avenues. A 3,700-foot twin-bore tunnel would take the artery beneath Golden Gate Heights. Parts of eight residential blocks would be taken in the Parnassus Heights area. An easterly branch consisted of a tunnel through Golden Gate Park past Kezar Stadium to the Panhandle, and a northerly branch went diagonally across Golden Gate Park via tunnel to Park-Presidio Boulevard.

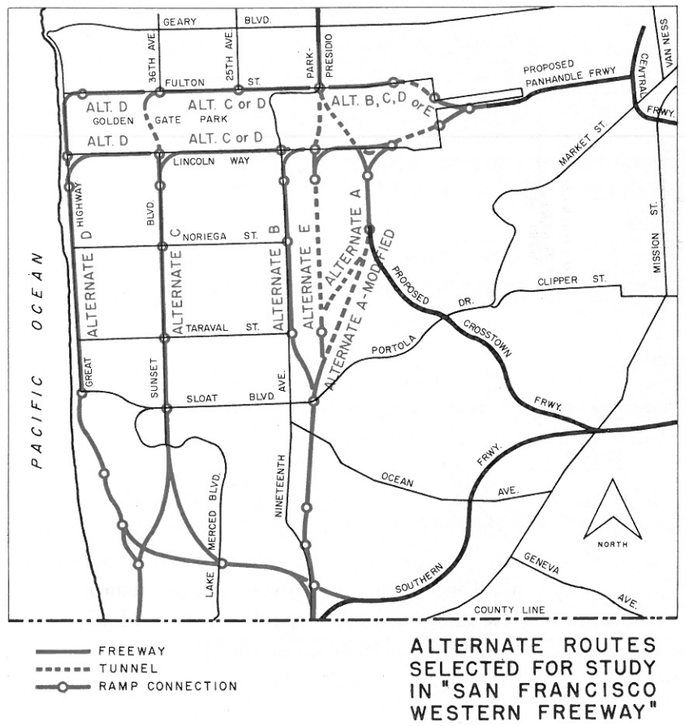
The Modified Trafficways (Long Tunnel) Plan: Alternate A-Modified. A 5,300-foot tunnel, with a portal at Wawona Street one block north of St. Francis Circle, was substituted for the shorter tunnel at Santiago Street to save five blocks of homes from acquisition.

The Nineteenth Avenue Route: Alternate B. This particular alignment, in order to accommodate the necessary freeway widths and underpass space, would affect more properties than any other alternate. It cut through the grounds of the Christian Science Benevolent Association, was across the street from the Shriners Hospital, and conflicted with several churches and schools.

Sunset Boulevard: Alternate C. Much public discussion centered around the concept of putting the freeway on Sunset Boulevard, which could be converted without taking private property. Widening of Lincoln Way to accommodate the freeway would be necessary either at the expense of all of the residential structures fronting on Lincoln Way from 36th Avenue to Seventh Avenue, or at the expense of a strip of Golden Gate Park. This route included bridging Lake Merced, a rearrangement of the Harding Park municipal golf course, and the construction of a freeway along Brotherhood Way bordering a group of church and fraternal properties.

Great Highway: Alternate D. This route has the same problems as Alternate C but to a greater degree.

Alternates C-Modified and D-Modified. Another proposal was to split the freeway along the park into two one-way roadways, one parallel to Lincoln Way eastbound and one parallel to Fulton Street



ALTERNATE ROUTES SELECTED FOR STUDY IN "SAN FRANCISCO WESTERN FREEWAY"

westbound. This would involve a lesser encroachment on the park on the Lincoln Way side, but would add a new encroachment of equal width on the Fulton Street side.

Junipero Serra Extension, Alternate E. This was a proposal to continue Junipero Serra Freeway north, between Fourteenth and Fifteenth Avenues to Golden Gate Park where a cross-park tunnel would provide a direct connection with Park-Presidio Boulevard. This route involved a mile-long tunnel under Golden Gate Heights and would require the acquisition of three residential blocks near Golden Gate Park and five blocks near St. Francis Circle for right-of-way. It would also necessitate an encroachment on Golden Gate Park along Lincoln Way and Fulton Street for about seven blocks.

THE C AND D ROUTES would attract only a third to a half as much traffic as the inner routes. It might even be questioned whether the volumes predicted for the outer routes would necessitate freeway design, since expressway or major thoroughfare design could probably accommodate these lower predicted volumes. The existing and future congestion and peak hour overloads on existing inner routes, however, would continue and become more aggravated.

The report pointed out that major disadvantages were common to the circumferential routes, C, D, C-Modified and D-Modified:

1. The longer driving distance for most San Francisco residents would mean that many motorists would continue to use existing congested closer-in arteries; thus, the new routes would not be used to planned capacities, nor would they be economically justified.

2. Use of Sunset Boulevard or Great Highway would remove them from their present "pleasure drive" category and prevent the continuation of recreational uses along their rights-of-way, which might prove to be a considerable loss.

3. Considerable intrusion on Golden Gate Park would be involved to provide for the border strips and the cross-park tunnels, and much of the planting that gives the park its character would be uprooted.

The extra cost of the longer tunnel in the A-Modified route is somewhat offset by a lower cost of right-of-way, as the loss of homes is about half that in Alternate A.

The only route that disturbs fewer dwellings is the C-Modified Sunset Boulevard-Lincoln Way-Fulton Street plan. However, approximately 4.8 acres of Golden Gate Park land would be required, which, it is estimated, has a value of almost two and a half million dollars. The C plan involves taking a considerably higher number of single-family dwellings than the A-Modified plan.

With these considerations of minimum disruption to homes, plus maximum traffic service benefits, the consultants recommended the A-Modified plan as the best of those studied.

SUMMARY AND COMPARISON OF ALTERNATE WESTERN FREEWAY PROPOSALS

	Alternate A	*Alternate A-Modified*	*Alternate C*	*Alternate C-Modified*	*Alternate E*
TOTAL COSTS FOR ROUTE	$61,217,900	$66,941,300	$40,668,300	$41,348,200	$68,281,900
Total Construction Costs	43,748,500	52,378,600	20,347,900	24,449,000	52,766,000
Total Right-of-Way Costs	17,469,400	14,562,700	20,320,400	16,899,200	15,515,900
Private Property	15,680,200	12,767,200	13,095,000	8,408,600	13,807,000
Public Property	1,789,200	1,795,500	7,225,400	8,490,600	1,708,900
PRIVATE PROPERTIES TAKEN					
Number of Buildings	549	446	451	240	454
Single-Family Homes	325	187	257	104	369
Other Dwelling Units	806	808	668	489	541
Commercial Units	69	56	34	33	52

Wilbur Smith and Associates: *San Francisco Western Freeway, Phase II, Route Location and Economic Study, 1957.* Table 9, Page 93 and Table 10, Page 94.

ESTIMATED 1980 DAILY TRAFFIC VOLUMES
SAN FRANCISCO WESTERN FREEWAY

Freeway Alternate	*County Line to Sloat Blvd.*	*Sloat Blvd. to Lincoln Way*
A—Trafficways Plan Route	86,000-96,000	88,000-124,000
B—19th Avenue Route	80,000-90,000	83,000-104,000
C—Sunset Boulevard Route	35,000-48,000	55,000- 60,000
D—Great Highway Route	28,000-35,000	39,000
E—Junipero Serra Extension	82,000-92,000	85,000-100,000

Wilbur Smith and Associates: *San Francisco Western Freeway, Phase II, Route Location and Economic Study, 1957.* Table 6, Page 86.

THE FREEWAY REVOLT

While the Western Freeway survey was under way, anti-freeway petitions containing approximately 30,000 signatures were presented at City Hall. Although the main area of activity was the Western Freeway study area, support was evident from other districts. While some city-wide groups such as the Central Council of Civic Clubs and the Council of District Merchants' Associations supported the protesters, others such as the Chamber of Commerce and the Downtown Association voiced attitudes favorable to freeways. In January, 1959, the freeway revolt culminated in the Board of Supervisors resolution quoted on page 8.

THE PACIFIC HEIGHTS TUNNEL

As a solution to the problem of providing a continuous connection through San Francisco for the Federal Interstate Highway System, Supervisor William Blake in the spring of 1959 proposed a long vehicular tunnel under Pacific Heights to connect the end of the Central Freeway at Golden Gate Avenue with the Golden Gate Bridge approach at Richardson Avenue. A study of this project was made by the San Francisco Department of Public Works, including route feasibility and cost estimates.

THE MAYOR'S COMMITTEE TO STUDY FREEWAYS

On May 21, 1959 Mayor George Christopher appointed a committee of sixteen representatives of home owners' associations, improvement clubs, labor unions, merchants and business groups to constitute the "Mayor's Committee to Study Freeways." Its purpose was to find a constructive answer for the city's need for traffic arteries. The chairman was Chris D. McKeon of the Property Owners' Association and the vice-chairman was Edward Barry of the West Portal Home Owners' Association.

THE PROGRAM OF THE MAYOR'S COMMITTEE

At its first meeting, held on May 21, 1959, the committee determined that its principal functions were: "1. to determine first of all if additional freeways are needed in San Francisco, and 2. if it was found that they were needed, to recommend a location for them where they would do the least damage to the citizens of San Francisco, conserving their homes and property."

Meeting at least once a month, the committee and its subcommittees had a high level of participation and interest. The facilities of the Department of Public Works and the Department of City Planning were made available to assist it in its deliberations and studies. Traffic engineers of the Department of Public Works ran special traffic counts of specific intersections and held a briefing session on the significance of origin-destination studies and other basic data. Conferences were held with staff engineers of the State Division of Highways, the City Planning Commission and staff members of the Department of City Planning. The Wilbur Smith report with its comparative analyses of Western Freeway routes was used as a basic study text.

The committee divided itself into groups to study three parts of the city: 1. the western corridor, approximately the Western Freeway study area; 2. the southeastern corridor to the east of the western corridor, and east of Market Street, Thirteenth Street and Harrison Street; and 3. the northwestern corridor made up of the rest of the city.

General questions set forth to be studied by the Mayor's Committee and its subcommittees were: feasibility of rapid transit on the Golden Gate Bridge; the future of the San Francisco Presidio; whether a second crossing to Marin County would be needed, and where; feasibility of a Pacific Heights Tunnel; location of a second Bay crossing to Alameda County; and the effect of a San Francisco rapid transit system on traffic patterns and demand.

When the committee submitted its report on April 22, 1960, a divergence of opinion was reflected in the submission of two reports from committee members: a majority report and a minority report.

THE MAJORITY REPORT

Chairman McKeon submitted the majority report, representing the opinion of nine members. Its main conclusions were:

1. The Southern Freeway should be completed in its entirety at an early date, with four lanes in each direction, including its extension to the Embarcadero Freeway at Howard Street.

2. When the Southern Freeway was completed, in approximately five years, it was proposed to restudy the need for a freeway through the western corridor.

3. In the meantime, modifications should be made to existing boulevards and major thoroughfares to improve their traffic-carrying capacity, without converting them into freeways.

4. The Federal Interstate Highway System should be routed over an existing or approved freeway route, such as James Lick Freeway or the Southern Freeway and its extension.

5. If a Western Freeway later should prove to be necessary, it was recommended that it follow substantially the Wilbur Smith Alternate C-Modified series of routes.

On Lincoln Way and Fulton Street it was proposed to avoid taking frontage property or park property by using a depressed freeway between retaining walls with cantilevered overhangs to accommodate the local service street. These one-way drives, besides connecting with Park-Presidio Boulevard, would connect to Fell Street and to Oak Street at the eastern end of the Park Panhandle.

No recommendations were made in the majority report on the Pacific Heights Tunnel or any other project in the northwestern corridor.

THE MINORITY REPORT

Committee members Burt Edelstein, Oscar H. Fisher, Jr., and Lou Jolly submitted a separate minority report in which a new Western Freeway was recommended, which followed essentially the Alternate A-Modified route of the Wilbur Smith report. It also recommended that an O'Shaughnessy Parkway be built instead of the Crosstown Freeway, and recommended other parkway routes that coincided with those on the 1951 Trafficways Plan.

In their report these members emphasized: 1. the lower accident rates on freeways; 2. the higher carrying capacity of freeways; 3. the advantages of freeways in removing congestion from city thoroughfares; 4. the fact that San Francisco traffic volumes have shown an average annual increase of approximately four per cent; 5. the considerable increases in traffic entering and leaving San Francisco in the last few years; 6. the predominance of San Franciscans in congested traffic on main thoroughfares; 7. the need to plan the city's freeway network as one complete and continuous system.

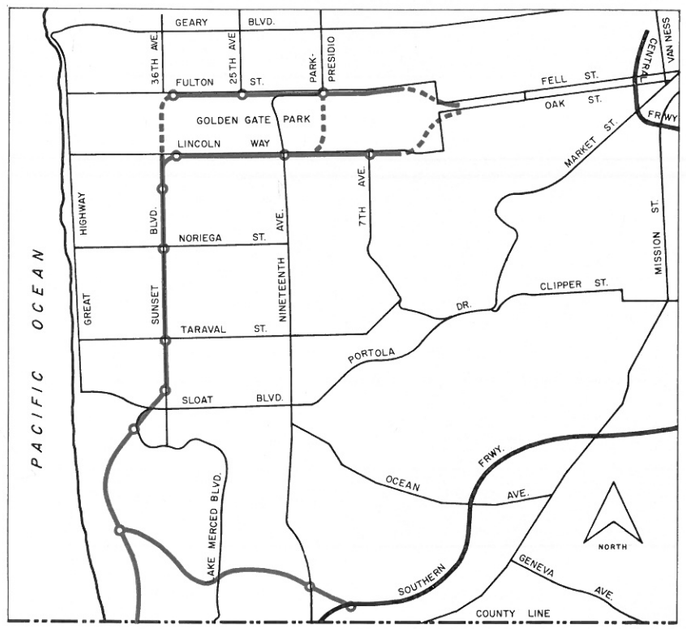
The minority report recommendations included:

1. Completion of the Southern Freeway and its extension to the Embarcadero Freeway.

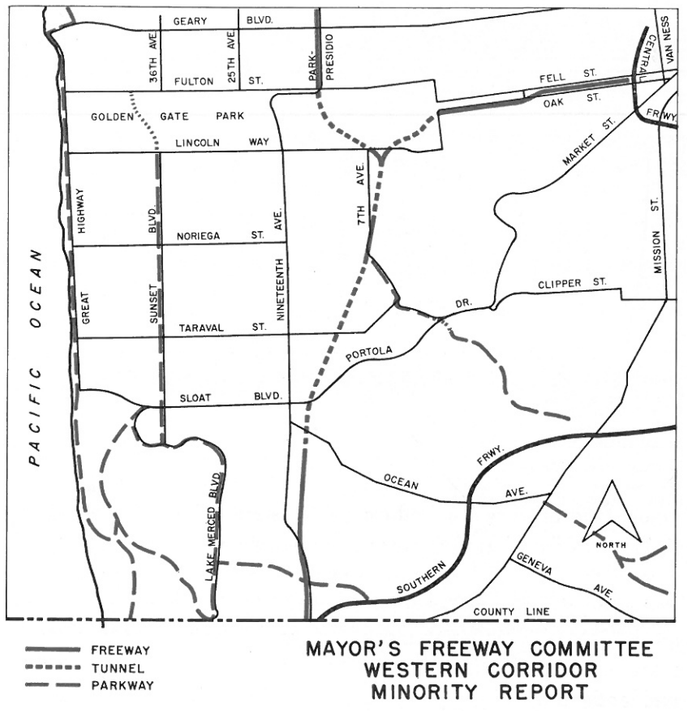
2. Construction of the Hunters Point Freeway.

3. Acceptance of the necessity of a Western Freeway on the Alternate A-Modified alignment, with further underground (cut-and-cover vehicular subway) construction beneath Junipero Serra Boulevard between St. Francis Circle and Ocean Avenue.

4. Provision of right-of-way funds to purchase properties as they become available in project areas.



MAYOR'S FREEWAY COMMITTEE
WESTERN CORRIDOR
MAJORITY REPORT



MAYOR'S FREEWAY COMMITTEE
WESTERN CORRIDOR
MINORITY REPORT

THE EFFECTS of FREEWAYS on NEARBY PROPERTIES

Opposition to the freeway route through the western residential area of San Francisco was partly based on the concept that such a route would be detrimental to property values. It was contended that a massive freeway structure would impair community appearance, encourage large volumes of noisy vehicles, restrict local traffic movements by splitting community areas and be incompatible with residential amenities.

On the other hand, it is not generally recognized that freeways may actually have considerably less detrimental effect on bordering properties than existing heavy-traffic arteries of traditional design, for instance:

Freeways separate heavy traffic from bordering properties. On a freeway, bordering properties are from 50 to 100 feet distant from the nearest traffic lane, while on an arterial street they may be separated from the nearest traffic lane only by the width of the sidewalk. Highways which are routed through the city on arterial streets require traffic signals with consequent stop-and-go driving, gear-changing noise and fumes. Because of the steady-flow characteristics of freeways and the landscaping of rights-of-way, traffic noises are muffled, fumes are dissipated and headlight glare is screened.

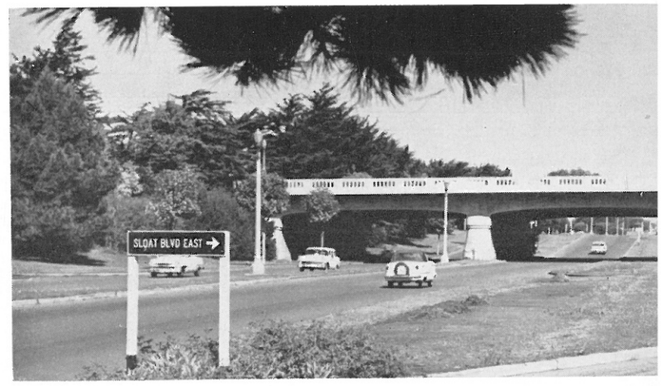
Freeways are safer than arterial streets. Families with children are often the first to move away from heavy-traffic arterial street highways. Freeways, however, are completely fenced off so that small children, in particular, are safe from traffic hazards. Experience in San Francisco has shown that there are 5.6 times as many accidents on arterial streets as on freeways for the same traffic volumes.

Freeways do not permit direct access to adjoining business. Because adjoining properties have direct access to arterial street highways, rezoning is often sought for service stations and other enterprises incompatible with residential uses, and commercial strips become established. Increasing traffic congestion caused by such developments requires a by-pass highway. In Castro Valley in Alameda County, for example, two successive by-passes were built to avoid such encroachments on the same route. A freeway is segregated from abutting properties and has parallel local service roads where required. Sound residential neighborhoods can be maintained along freeways since commercial uses are discouraged by lack of direct access.

Arterial street highways, as well as freeways, are traffic barriers. Because local traffic is carried over or under freeways, freeways have less of a barrier effect at the points of crossing than do arterial street highways where cross traffic must wait for signal changes or, if there are no signals, for a lull in the highway traffic.

Freeways can be attractive. By using proper design standar a freeway can be attractive and will cause less damage to the ar traversed than arterial street highways.

GRADE SEPARATED SLOAT AND SUNSET BOULEVAI
Although Sunset Boulevard is not a freeway, illustrates the landscaping standards that can achieved in freeways.



THE PARKWAY CONCEPT

The world's first express highway was the Bronx River pa way, built between 1913 and 1925 as a road in a park strip set to conserve, enhance and preserve from pollution the beauti Bronx River. This express parkway stimulated the passage of a fi million dollar bond issue for other such parkway routes in We chester County, New York.

The New York parkways of the 1930's had no right of acc from adjoining properties, were grade-separated and excluded co mercial vehicles as these routes were considered pleasure driv Wide rights-of-way, extensive landscaping and space for recr tional activities insured that they would not be challenged as bo fide park facilities. The parkway was soon recognized as a new ty of motor artery and, prior to the enactment of the freeway laws California, New York and elsewhere in the 1930's, was the o way a through-traffic highway could be built where access to abutt properties was restricted. The concept of the Federal Interst Highway System was born in 1939, and various states passed leg

lation authorizing construction of freeways, expressways, thruways and turnpikes designed for general highway traffic. Some were built as toll roads; others as free facilities.

FREEWAYS DEVELOP

The capacity of California's first freeway, the Arroyo Seco parkway, built in 1939, was reached in a short period of time and a third lane in each direction had to be added. Since early parkways had only grassy plots alongside, traffic jams resulted from one disabled automobile parking on the pavement. Today freeways have emergency turn-out lanes on each side of a four-lane road. Where the early parkways were designed for speeds of 40 miles per hour, present freeways are generally designed for speeds of 65 miles per hour. These design speeds require longer curves and sight distances, easier grades and wider traffic lanes. As trucks and buses must be accommodated, grades must be designed to allow heavily loaded vehicles to keep up with traffic, lanes must be wider, vertical clearances greater and bridges must be built for maximum load capacity.

While parkways had to be attractively landscaped to protect their park status, in California objections were raised that gas tax funds should be spent on more miles of freeways rather than on beautification and costly landscape maintenance. Much early landscaping was done as preventive maintenance, for soil stabilization and as a headlight glare barrier. Now, however, policies and budgets do allow for freeway beautification and there are parts of the California freeway system where a natural park-like setting is developing through the use of low-maintenance native plant materials.

FREEWAYS & PROPERTY VALUES

EXPERIENCE IN CALIFORNIA

In 1957, a comprehensive study of market values in subdivisions bordering four freeways in California was made by the California Division of Highways (John F. Kelly, "Residences and Freeways" in *California Highways and Public Works*, March 1957). The survey included data on 1,092 resales in tracts alongside the Bayshore Freeway in San Mateo County, the Nimitz Freeway in Alameda County, and the Santa Ana Freeway and San Bernardino Freeway in Los Angeles County. Base period was 1954 when all four freeways were in operation.

In a study of all resale prices in the subdivisions, it was found that freeway-adjacent homes compared with others had higher prices in 26 per cent of the cases, lower in 36 per cent of the cases, and about the same in 38 per cent of the cases. Overall, there was about a one to two per cent resale value penalty associated with properties adjacent to the freeway. Those bordering the freeway at greater distances from traffic lanes tended to fare better than those closer to traffic lanes. On initial sales, subdividers found no need to reduce prices or make more favorable financial terms for homes bordering the freeway.

The economists making the survey felt that the one to two per cent overall freeway-adjacent value penalty might be in large part attributable to attitudes of lending institutions rather than being a true reflection of attitudes of residents and buyers. Responses to the survey questionnaire indicated that although some occupants thought the freeway a nuisance, others liked it, and most thought it to be of no consequence in enjoyment of their homesites. Similar divisions of opinion were found on questions as to whether they would move to another location near a freeway, or whether they thought the freeway had any adverse effect on the value of their homes.

EXPERIENCE IN SAN FRANCISCO

In September of 1960, a survey was completed of the effect of the James Lick Memorial Freeway on changes in residential property values on adjacent lots. This was the first time in California that such a comprehensive survey was made of older residential properties which existed before the freeway was built.

For this survey, initiated in the fall of 1959 by the San Francisco Department of City Planning, records of property sales were obtained in residential areas bordering the James Lick Memorial Freeway for a depth of 200 feet from the right-of-way (two tiers of lots on either side), as well as in control areas.

The study area, totaling 3.6 miles in length, extended from Seventeenth Street on the north to Third Street on the south. It was divided into three sections based on time of construction. For each section "before freeway" and "after freeway" periods were established.

1. From Seventeenth Street to Army Street: "before"—January 1948 to July 1953; "after"—July 1953 to July 1959.
2. From Army Street to Alemany Boulevard: "before"—July 1946 to July 1951; "after"—July 1951 to July 1955.
3. From Alemany Boulevard to Third Street: "before"—July 1949 to July 1953; "after"—July 1953 to July 1959.

The freeway frontage (tier one) properties, the next further away (tier two) properties, and the control area properties were all located in stable built-up parts of San Francisco, predominantly single-family residential in land use and in zoning. Some apartments existed, but not as many as zoning would allow. Much of the housing predates 1921, although newer housing is interspersed with the older homes or occurs in typical closely built rows. Maintenance is average with some very well maintained and a few in great need of rehabilitation.

Income level of residents of the study area was slightly above the city's median income in 1950. Neighborhoods in which the freeway strips were located included Potrero Hill, Peralta Heights, Bernal Heights, Silver Terrace, and the Portola and Bayview districts. Industrial properties in the Islais Creek area and near Paul Avenue to the east of the freeway, as well as commercial properties in the community shopping area along San Bruno Avenue parallel to the freeway, were not included in the survey.

Control areas, similar to the freeway study areas in population characteristics, housing types, age of structures, neighborhood characteristics and typical property values, were chosen in the Bayview district, Visitacion Valley and the area near Mission Street and Silver Avenue.

To establish properly all factors of sale and resale prices, field interviews were made with those participating in transactions.

Three different means of comparing value changes in the "before" and "after" periods were used: 1. sales in "before" periods were compared with sales in "after" periods and averaged for the freeway area and for the control area; 2. only those properties where the same parcel changed hands in both the "before" and "after" periods were tabulated, and increases averaged for the freeway area and the control areas; and 3. appraisals of vacant residential lands that had been made in the "before" period were compared with appraisals made of the same parcels in the "after" period, and increases averaged for the freeway area and the control area.

VALUE CHANGES OF RESIDENTIAL PROPERTIES BORDERING THE JAMES LICK MEMORIAL FREEWAY COMPARED WITH CONTROL AREAS

1. *Average Increases in Values of All Properties Sold "After" Freeway Completed Compared with All Sales "Before" Freeway*

	Average Value of Sales "Before"	*No. of Sales*	*Average Value of Sales "After"*	*No. of Sales*	*Average Increases Dollar*	*Per Cent*
Freeway-Adjacent Zone	$ 8,981	229	$11,601	289	$2,620	29
Control Area	9,564	119	11,139	147	1,575	16
FREEWAY ZONE						
Tier One	8,925	89	11,618	116	2,693	30
Tier Two	9,017	140	11,589	173	2,572	29
FREEWAY ZONE						
Apartments	11,701	46	15,868	67	4,167	36
Single-Family	8,297	183	10,313	222	2,016	24

2. *Average Increases in Values Found in Repeat Sales of Same Parcels "Before" and "After" Freeway Completion*

	No. of Parcels	*Average Increases Dollar*	*Per Cent*
Freeway-Adjacent Zone	65	$2,090	23
Control Area	46	2,030	23
FREEWAY ZONE			
Tier One	20	2,468	29
Tier Two	45	1,963	20
FREEWAY ZONE			
Apartments	12	3,957	34
Single-Family	53	1,587	20

3. *Average Increase in Values of Vacant Residential Lots as Appraised "Before" and "After" Freeway Completion*

	Appraisal "Before"	*"After"*	*Average Increases Dollar*	*Per Cent*
Freeway-Adjacent Zone	$1,700	$2,350	$650	38
Control Area	1,550	2,050	500	32
FREEWAY ZONE				
Tier One	1,700	2,350	650	38
Tier Two	1,700	2,350	650	38

SURVEY FINDINGS

The James Lick Memorial Freeway did not depress values of fronting properties. This survey indicated that residential freeway frontages actually increased in value at a slightly greater rate than properties in the control areas.

Perhaps the most significant findings were that in resales of the same parcels where prices "before" and "after" freeway opening could be ascertained, the percentage increases for tier one properties were the same as for the control areas and also that the tier one lots increased more than the tier two lots. Parcels used for apartments and fronting on the freeway increased in value to a greater extent (36 per cent) than single-family residential properties (24 per cent).

The analysts concluded that the measurable beneficial effect on freeway frontage was in the vicinity of a three per cent average increase. Although the improved freeway properties, where the same parcel was sold "before" and again "after," showed no difference from the increases in the improved properties in the control areas, vacant land transactions apparently reflected anticipation of future intensive use of the freeway frontage lands as opposed to those in the control areas. Transportation proximity advantages appear to stimulate increases in values of apartment sites near a freeway.

It is significant that in San Francisco no detrimental effect on the value of single-family homes could be found in the freeway property survey.

EFFECTS OF RIGHT-OF-WAY ACQUISITION

All people concerned with the problems of freeway location agree that some property owners will be adversely affected if their properties are acquired. Although the law insures that they will receive fair market value, there may be intangible or non-measurable values for which they cannot be compensated under present provisions of law. These losses are different for the owner-occupants of single-family homes, for non-resident owners of apartment or business properties, and for owners of businesses.

Such uncompensated losses, however, also occur when land is acquired for other public improvements, such as schools, playgrounds, libraries, firehouses or rapid transit lines. The losses must be balanced against the benefits received by citizens of the community as a whole in their use of the new facilities. In the case of freeways, these are transportation convenience and the removal of congestion from local streets.

Owner-occupants of single-family dwellings may not always be compensated for features of their homes worth much to them but of little significance to the real estate appraiser. The advantages of their own particular neighborhood and its social and cultural ties are intangibles which are lost if they cannot relocate in the same area. This may be a factor of greater importance in San Francisco with its scarcity of vacant lots and its low vacancy ratio than in other urban areas.

Owners of small businesses cannot be compensated for customer goodwill lost by moving. The community itself may suffer a loss when a portion of a business district is razed and new trading patterns must be established.

Owners of income properties generally do not suffer substantial uncompensated losses when their holdings are acquired. Likewise, little loss can be claimed by residential tenants, since their status is by nature transient, and their tenure is subject to the landlord's desires.

In short, owners of single-family homes and small retail businesses are more adversely affected than owners of income properties. Such factors must be considered in freeway route selection.

COMMUNITY APPEARANCE AND AMENITIES

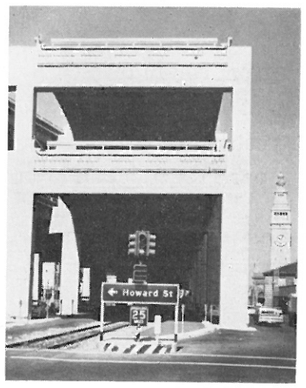
A vital factor in freeway location is the effect upon properties which are close to the right-of-way. Strongest objections to a proposed route are apt to come not from those in the right-of-way, but from those who would be close to the completed project.

Studies have shown that fears of drastic property devaluations from freeway proximity effects appear to be groundless. Studies have also shown that properly designed freeways can provide healthier and safer neighborhoods. At the same time, general adverse effects on the community and its appearance must be guarded against. In addition to appearance, interference with light and air and the possible barrier effect of a freeway must be considered.

Elevated structures are most apt to mar community appearance, the effect increasing with the height of the structure. For this reason the 1951 Trafficways Plan limited such structures to industrial districts and to places where topography made their use mandatory. The acceptability of elevated structures depends also on their design.

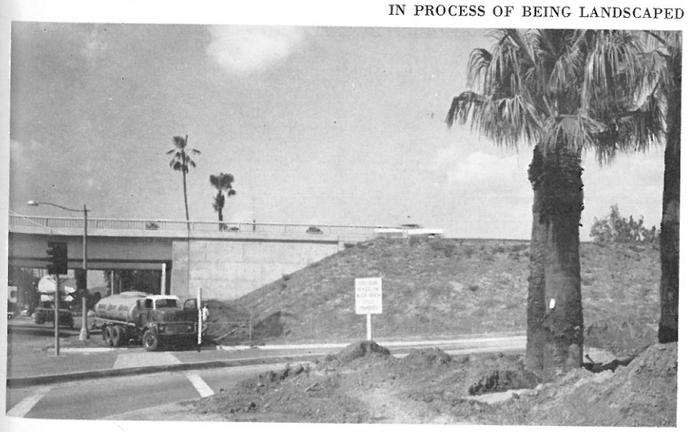
An elevated section of freeway can interfere with the light, air and outlook of neighboring properties, depending on its height and proximity. On the other hand, it constitutes no barrier to surface cross movements of pedestrians or vehicles since it is usually underpassed.

THE EMBARCADERO FREEWAY



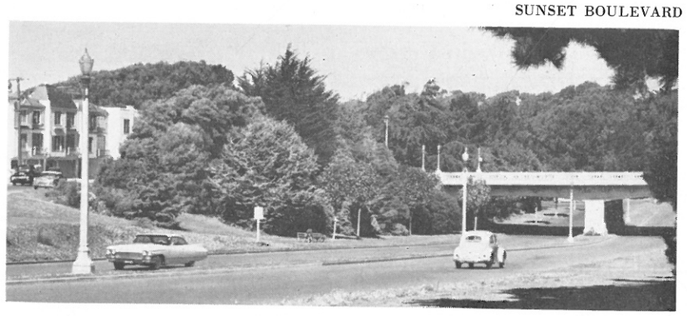
Freeways on elevated fills need not create a detrimental visual impact on the community, because by skillful landscaping they may be turned into park-like slopes and thus into a visual asset. Both elevated fills and depressed freeways are physical barriers to the extent that underpasses or overpasses for cross streets are not provided. If they are provided at every cross street, as is done for some urban freeways, no barrier to cross movements exists. An elevated fill freeway does form a visual, and hence psychological, barrier.

THE RIVERSIDE FREEWAY
IN PROCESS OF BEING LANDSCAPED



Depressed freeways create considerable open space and their visual effects depend upon architectural design and skillful landscaping. Depending on the quality of design, they can either harmonize or clash with their surroundings. They do not deprive neighboring properties of light and air.

SUNSET BOULEVARD



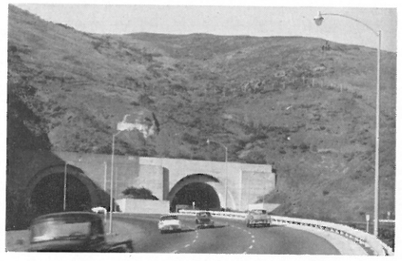
Freeways at grade should have no more or no less visual effect than wide boulevards, depending on the design quality of appurtenances such as fences, light standards and bridges. Properly landscaped, they could resemble park strips. They should not affect the light and air of adjoining properties.

THE NIMITZ FREEWAY

However, a freeway at grade is most apt to be a true barrier, since overpasses or underpasses require long and costly ramps and their number must be limited. Such a barrier can be desirable between residential and industrial areas. The barrier effect is disadvantageous where it is imposed on the interior of an already mature neighborhood or district. Interference with existing patterns should be avoided insofar as possible in a built-up city like San Francisco.

Freeway tunnels, except at portals and open interchanges, have no visual impact on the community, do not disturb the light and air, and obviate the barrier effect. A high quality of design and landscaping will reduce problems at tunnel portals. Vehicular subways have the same advantages and problems as tunnels.

THE WALDO TUNNELS
MARIN COUNTY



TRANSPORTATION CONVENIENCE

A freeway generally reduces travel time by auto, bus and truck to downtown areas, employment centers and out-of-town recreation areas, thus providing a measurable time advantage for nearby property owners over their previous situation and in competition with other areas. There appear to be particular advantages to properties zoned for apartments, shopping centers and industry.

REMOVAL OF CONGESTION FROM LOCAL STREETS

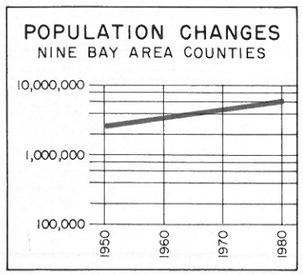
A dividend to property owners with frontages on existing congested major thoroughfares from the construction of an urban freeway is the diversion of traffic. Shoppers can get in and out of parking spaces more easily, and residents can use their private driveways more easily. Above all, the possibility of accidents on these streets is reduced in direct proportion to the amount of traffic diverted to freeways. Side streets also benefit from the reduction in traffic.

The net effect should be to increase property values on the major street frontages. These considerations might be of considerable importance in San Francisco to owners of property on Alemany Boulevard, Van Ness Avenue, Fell and Oak Streets, Nineteenth Avenue and Lombard Street.

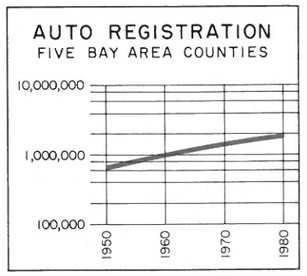
Not only are nuisance effects reduced for frontage property owners, but those who continue to use city streets regularly can use them with less traffic congestion frustration and accident hazard. These results are easily seen on Bayshore Boulevard in Visitacion Valley and on Potrero Avenue.

Factors IN PLANNING TRAFFICWAYS

At intervals of ten years or less elements of the Master Plan should be reevaluated and revised. The need for a revision of the Trafficways Plan is clearly indicated by the recent census statistics on Bay Area population increases and by revised population projections. San Francisco's position as the central core city of the Bay Area makes its trafficways essential arteries to serve the whole region.



The graph of the 9-county Bay Area population shows that between 1950 and 1960 the population increased by 911-000 or 34 per cent. Projections to 1975 indicate a further increase of 1,940,000 persons or 54 per cent. The total estimated increase for the 25 years is 2,851,000 or 106 per cent. The current projection for 1975 for the 9-county area, approximately 5,500,000 people, illustrates a rate of growth faster than was earlier anticipated. In the 1948 Transportation Plan report the 1970 prediction for the 9-county area was between 3,000,000 and 3,900,000, or a maximum of about 4,400,000 if the trend had been extended to 1975.



Projected automobile registration for the five counties of the San Francisco metropolitan area represents the potential users of a 1975 San Francisco trafficways system. From 1950 to 1960 automobile registration increased by 325,800 or 45 per cent. Projections to 1970 show a further increase of 38 per cent and over that from 1970 to 1980 of 35 per cent. In the thirty-year period automobile registration is likely to grow 170 per cent. As in the case of population, the number of autos in the Bay Area is now estimated for 1970 at a considerably higher figure than was predicted in the 1948 Transportation Plan report, when about 1,500,000 automobiles were predicted for the 9-county area for 1970. At the present time, that many autos are predicted in 1970 for only the five inner Bay Area counties in the Bay Area Rapid Transit District.

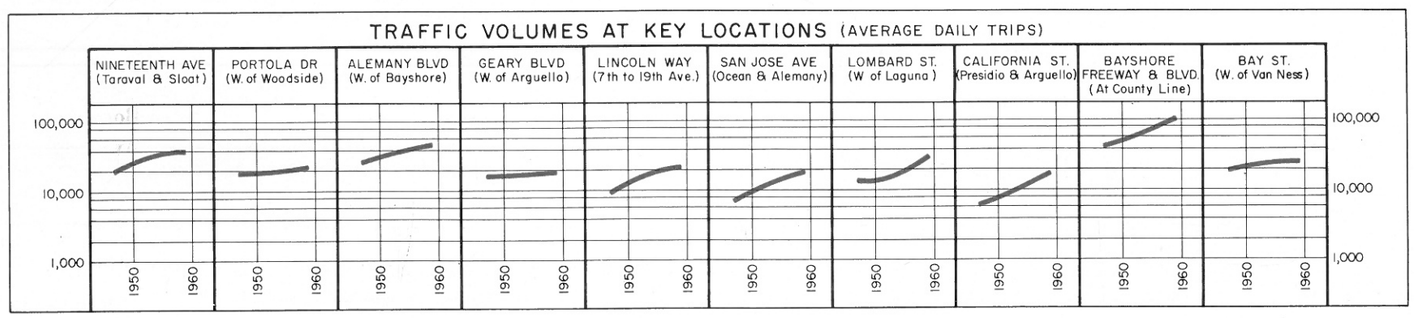
Traffic volumes at ten key locations in the existing trafficways system have grown tremendously, with few exceptions, as measured in 1947, 1954 and 1959. These figures present a picture of overloaded traffic arteries. On James Lick Memorial Freeway (Bayshore Boulevard in 1947) for example, the average daily traffic has increased by 138 per cent since 1947. The faster than anticipated growth is further illustrated by the fact that the predicted 1970 daily traffic volumes contained in the 1948 Transportation Plan report have all been exceeded in current traffic counts.

Such a severely overloaded traffic system emphasizes the need for a reevaluation of the Trafficways Plan in the light of current conditions. Of paramount importance is the development of a freeway system designed to relieve inadequate city streets of their ever increasing burden and restore, at least in part, the quiet and relaxed living in residential areas.

CORDON COUNTS

A reliable index of the need for a city-wide system of freeways is the change of movement into and out of the downtown area. A measure of this change is provided by the cordon counts conducted in the city in October 1947 and July 1959. These counts recorded the traffic movements from 7 a.m. to 7 p.m. into and out of a specific section of the downtown area and its immediate environs (called the Metropolitan Traffic District or MTD). The cordon counts also give a picture of the accumulation of persons and vehicles in the downtown area during the day.

In 1959, during a 12-hour period, 316,000 vehicles entered the MTD in contrast to 228,000 vehicles in 1947, an increase of about 38 per cent. In the evening peak hour in 1959, 47,355 vehicles left the MTD as compared with 35,915 vehicles in 1947, an increase of about 32 per cent.


TRAFFIC VOLUMES AT KEY LOCATIONS (AVERAGE DAILY TRIPS)
NINETEENTH AVE (Taraval & Sloat)
PORTOLA DR (W. of Woodside)
ALEMANY BLVD (W. of Bayshore)
GEARY BLVD (W. of Arguello)
LINCOLN WAY (7th to 19th Ave.)
SAN JOSE AVE (Ocean & Alemany)
LOMBARD ST. (W of Laguna)
CALIFORNIA ST. (Presidio & Arguello)
BAYSHORE FREEWAY & BLVD. (At County Line)
BAY ST. (W. of Van Ness)
100,000
10,000
1,000
1950
1960

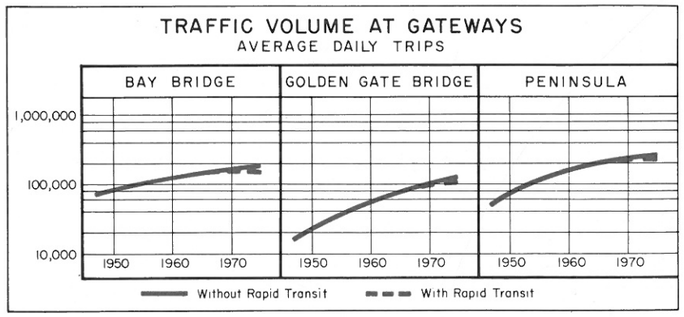
SUMMARY OF CORDON COUNT DATA

	1947		1959	
12 Hours (7 a.m. to 7 p.m.)	*Entering*	*Leaving*	*Entering*	*Leaving*
Persons	586,732	556,529	671,462	645,176
Vehicles	228,745	220,940	316,000	304,846
Passenger Autos .	171,027	163,018	275,355	264,637
Evening Peak (4:30 to 5:30 p.m.)				
Persons	52,145	122,336	58,981	133,521
Vehicles	22,854	35,915	30,392	47,355
Passenger Autos .	18,167	30,721	27,193	43,716
Maximum Net Accumulations				
Total Persons	176,024		165,054	
Total Vehicles	30,800		44,141	
Total Passenger Autos .	30,569		42,930	

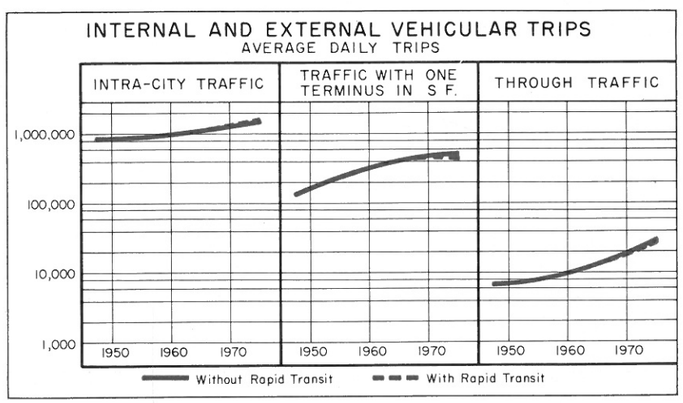
The total number of persons carried by auto and transit also increased in the twelve-year period, although a change in riding habits from the first postwar years has seen a decline in public transit patronage and a shift to use of private autos, which has accentuated downtown traffic congestion. The net accumulation of vehicles in the MTD has likewise increased, although a slight decline in accumulation of persons was noted.

TRAFFIC VOLUME AT GATEWAYS

Checks of the traffic volumes entering and leaving the city at its three major gateways for the years 1947, 1959, and as projected to 1975 both with and without the development of rapid transit show that there has been a tremendous increase in the amount of traffic entering and leaving the city and that there will be further increases. Without the existence of rapid transit by 1975 the problem of handling the volume of traffic with freeways alone will be overwhelming.



However, the graph below shows that the amount of through traffic is negligible compared to that which has either an origin or destination within the city. The greatest amount of traffic by far has both its origin and destination within the city. The present and projected amount of this intra-city traffic seems to make imperative the continued construction of freeways within the city to enable people to travel from one place to another freely and conveniently, and to remove the congestion from the city streets.



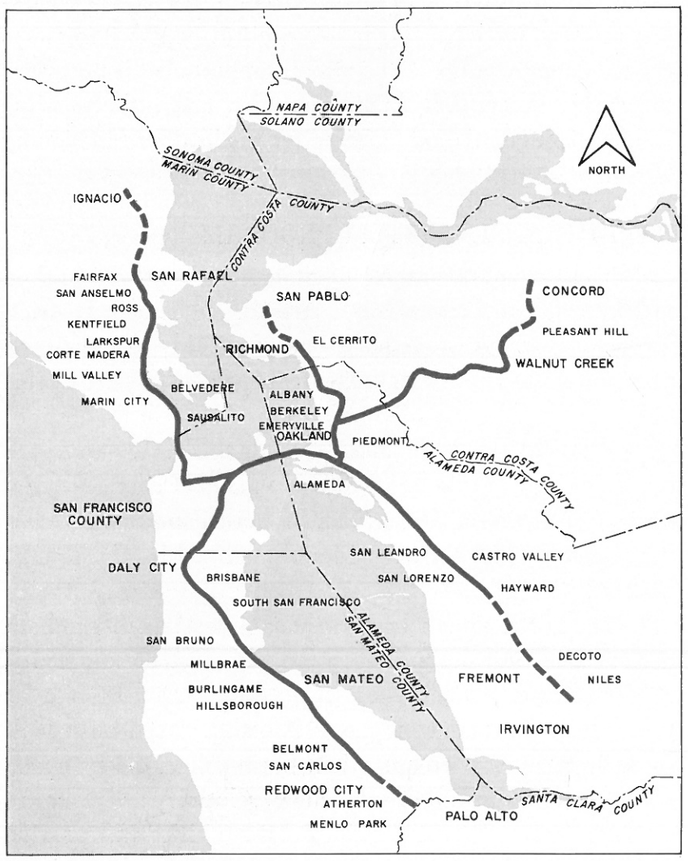
NEED FOR RAPID TRANSIT

Public transportation as a basic and long established means of transporting people has been overshadowed in recent years by the great increase in use of individual motor vehicles as the primary mode of movement for personal trips. As a result, the greatest public effort for the facilitation of this movement has been toward the construction of freeways, improved city street circulation and large parking facilities. However, the private automobile is less efficient than public transportation, and in particular rapid transit, in the amount of space taken up by the vehicle per passenger. Exclusive reliance on the automobile, especially for the longer commuter trips, will soon reach the point of diminishing returns with respect to the provision of right-of-way for freeways and parking facilities. It is becoming increasingly evident that freeways are not enough and that in addition rapid transit is necessary to provide relief from traffic congestion and make possible fast, efficient circulation required for the healthy functioning of a metropolitan area.

RAPID TRANSIT SYSTEM PROGRAM

To this end, the California State Legislature established in 1958 the San Francisco Bay Area Rapid Transit District, giving it taxing powers and the responsibility of creating a plan for a five-county Bay Area rapid transit system. This plan is intended to be submitted to the voters in the form of a bond proposition to finance construction. If it is approved by two-thirds of the voters in the five member counties (Alameda, Contra Costa, Marin, San Francisco and San Mateo), the system will be constructed and operated by the Transit District.

The District has set certain standards of quality in both performance and design which it feels must be attained if the system is to compete successfully with the automobile for passengers. Particular emphasis is being placed on a high speed frequent service operation. Inasmuch as the system is to be a regional or interurban system, relatively few stops are planned. It is expected that local communities will provide their own transit feeder services connecting with the regional system stations.



PROPOSED RAPID TRANSIT ROUTES
SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

ANTICIPATED DIVERSION TO RAPID TRANSIT

There is an increasing popular acceptance and recognition of the need for rapid transit. In fact, the consultants of the Transit District have made special studies of local conditions to determine the anticipated future diversion to rapid transit from other modes of transportation. From these studies they have estimated that in a 24-hour period in 1975 (assuming the completion of those portions of the 1951 Trafficways Plan not objected to by the Board of Supervisors in their resolution of January 1959), four per cent of the total trips within San Francisco would be diverted to rapid transit. However, inasmuch as rapid transit is primarily an interurban form of transportation, the great majority of trips diverted to it would have either origin or destination, but not both, within the city. Of these trips, it is estimated that 19 per cent would be diverted to rapid transit. As they would be largely commuter type trips occurring during the peak hours, their diversion would serve substantially to facilitate movement into and out of San Francisco and ease the burden on the freeways. This prospective diversion has been taken into account in this study.

ANTICIPATED CHANGES IN LAND USE

Large scale developments and changes in land use will substantially modify traffic flows in specific areas of the city. Certain basic assumptions have been made in respect to land use to anticipate their effect, in future traffic demands, on the freeway systems being tested.

For the working area of San Francisco, composed of the central business district and the light and heavy industrial areas along the eastern side of the city, the following assumptions have been made:

1. There will be a substitution of hotel, recreation, convention, restaurant and other commercial and marina activities for much of the port facilities along The Embarcadero north of Market Street.

2. There will be an intensification of office uses in the central business district as a result of redevelopment in the Golden Gateway project area and with the provision of rapid transit on Market Street.

3. There will be a substitution of service activities such as warehousing, printing and transportation for light manufacturing and blighted residential uses in the South of Market district.

4. There will be an intensification of port terminal facilities in the Islais Creek area and on the northern side of Hunters Point.

5. There will be a substitution of high density residential development for the produce market and warehousing activities in the Golden Gateway project and in the area north of Broadway between Telegraph Hill and The Embarcadero.

6. There will be an intensification of industrial uses in the vacant industrial lands near Third and Army Streets and in the South Basin area.

7. The industrial tidelands south of Hunters Point will be filled and developed.

8. There will be an intensification of City, State and Federal facilities and employment in the Civic Center area.

For the residential areas of San Francisco, the following assumptions have been made:

1. All appreciable undeveloped residential land, including the Diamond Heights redevelopment project, will be absorbed by 1965.

2. Through private and federally assisted redevelopment, there will be an intensification of new residential development in the older areas of the city.

THE SURVEY TECHNIQUES

In order to evaluate a freeway or freeway network, justify the expense of construction and insure adequate route design of its elements, it is necessary to forecast the volume of traffic that would be attracted to it.

FORECASTING TRAFFIC VOLUMES

To obtain a reliable estimate of future traffic volumes on various possible routes, two steps are required: 1. forecasting the total trips that can be expected to go from one part of the city to another, and 2. assignment of these trips to specific routes and modes of travel to ascertain the extent to which the route would be adequate to the traffic demand.

ORIGIN-DESTINATION SURVEYS

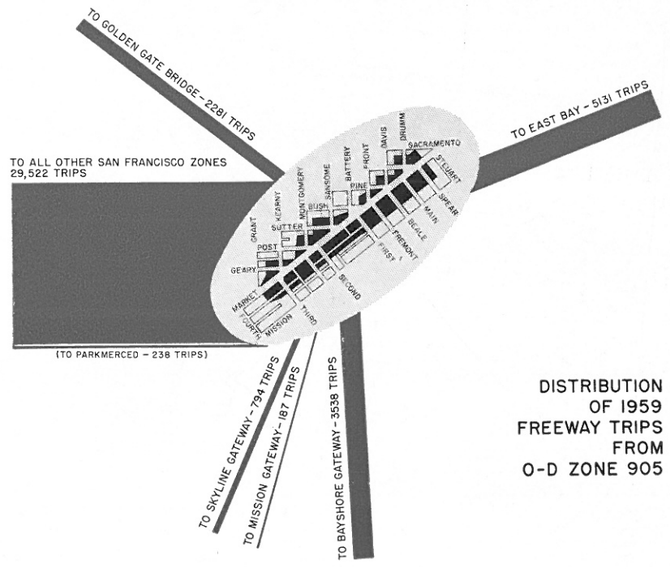
Basic data for the forecasts were provided by the Bay Area Metropolitan Traffic Survey (BAMTS) which was undertaken jointly by the State Division of Highways, the City and County of San Francisco, eleven East Bay cities and the Federal government in 1946 and 1947. It included an origin-destination (O-D) survey to show a comprehensive pattern of all daily movements of persons by vehicle, including public transit vehicles. Trained interviewers visited one out of every twenty families in the survey area and obtained details of each trip made during the day by every member of each family, and the purpose and mode of travel of each trip. Business trips, journeys to work, shopping trips, errand trips and recreation trips were separately tabulated. Auto, public transit and truck trips likewise were segregated.

Specific small districts with relatively uniform traffic characteristics, called O-D zones, were used for the measurement and forecasting of vehicular or transit trips. Complete data were thus obtained for movements from each O-D zone to each other O-D zone, by purpose and mode of travel. These zone-to-zone trips, when plotted on a map, become the desire lines. It is these desire lines that are used as the raw material for the assignment to route, the second phase of the traffic volume prediction.

THE O-D SURVEY REVISION

Rather than make a new O-D survey for this reappraisal of the Trafficways Plan, tested procedures were utilized to update the 1946-47 BAMTS O-D survey to 1959 levels and, through computations similar to those of the original survey, to predict the O-D pattern in 1975. Detailed data on changes in population, employment and number of automobiles in each O-D zone in the city were obtained. A high speed electronic computer was utilized to apply growth factors reflecting the changes in these zones. These estimated 1959 traffic volumes were then checked against actual traffic counts made of vehicular movements and transit passenger movements across particular cordon lines within the city.

Data derived by this method are shown in the diagram below, using the Parkmerced area, Zone 957, and the Lower Market Street area, Zone 905, for the purpose of illustration. It was computed that the number of trips made daily between these two zones amounted to 238, and that, of the 41,383 trips starting or ending in Zone 905, there were 29,552 trips conversely ending or starting within the city limits with the remaining 11,831 being to or from out-of-town.


TO GOLDEN GATE BRIDGE - 2281 TRIPS
TO ALL OTHER SAN FRANCISCO ZONES
29,522 TRIPS
TO EAST BAY - 5131 TRIPS
(TO PARKMERCED - 238 TRIPS)
TO SKYLINE GATEWAY - 794 TRIPS
TO MISSION GATEWAY - 187 TRIPS
TO BAYSHORE GATEWAY - 3538 TRIPS
DISTRIBUTION
OF 1959
FREEWAY TRIPS
FROM
O-D ZONE 905

Total traffic volume figures for the city were obtained by making a summation of all the trips into and out of each of the 73 zones in San Francisco, including external trips into and out of the city. Desire lines were plotted from which major desire lines were determined. Similar procedures were followed to obtain predicted 1975 traffic volumes. The major desire line maps for 1947, 1959 and projected for 1975 show the major traffic desires graphically.

The extent of traffic movement growth is shown in the following figures for 1947 trips compared with estimated 1959 and predicted 1975 trips:

GROWTH OF DAILY VEHICULAR WEEKDAY TRIPS IN SAN FRANCISCO

Year	*Total Trips*
1947	915,000
1959	1,212,000
1975	1,824,000

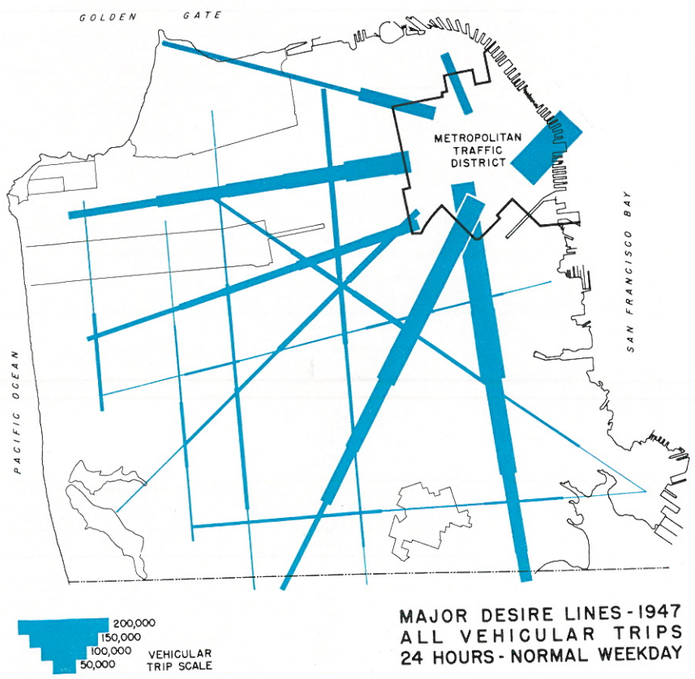
ASSIGNMENT OF TRAFFIC TO ROUTES

With the number of trips established that would take place between all of the O-D zones of the city in 1975, the question remained: What volumes would utilize which of several proposed alternate freeway networks and what volumes would continue to use city streets, either with or without a rapid transit system available?

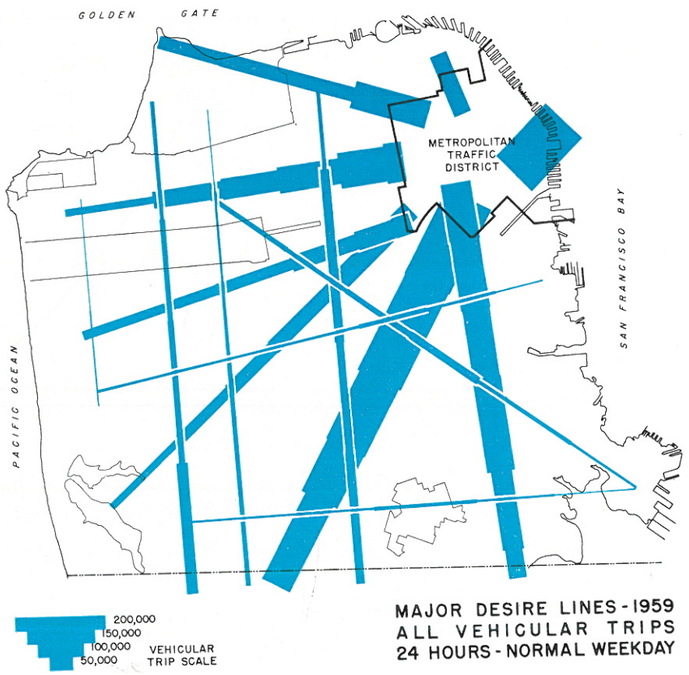
In the last twenty years, as more mileage of freeways and other limited-access highways have come into use, studies have been made of the extent to which motorists use them in preference to city streets. The results of these studies show that predictable proportions of traffic use the freeways where such choices are open, and the relative proportions depend on differences in travel times and travel distances.

To find the proportions of all of the 1975 vehicular traffic that would use the freeways, the following steps were used in the analysis of each proposed alternate network:

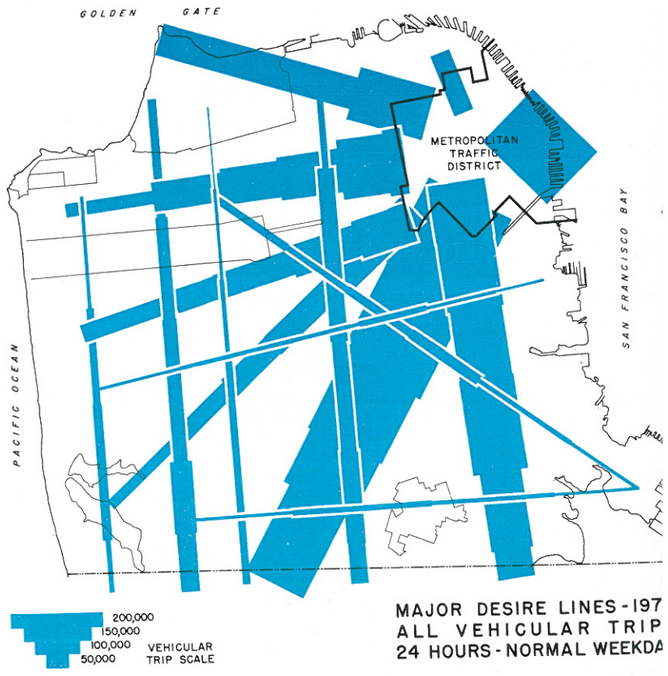
1. Each potential interzone trip was plotted over several logical routes that could be followed on major city streets and on the freeway network being analyzed.
2. Typical driving speeds and distances for each section of these routes were worked out and recorded on computing machine punch cards.
3. Electronic computer methods were used to compute the quickest route via major city street and via freeway.
4. Volumes of traffic between specific points were assigned by computer methods through use of tested formulas to major city streets and to freeways on the basis of relative driving times via either route.
5. These were added together for all of the interzone movements and provided predicted total travel volumes on a typical week day for the freeways and for the major city street routes. Trips entirely within a zone were not included.
6. Peak hour flows were estimated as a proportion of the total 24-hour flow.



MAJOR DESIRE LINES - 1947
ALL VEHICULAR TRIPS
24 HOURS - NORMAL WEEKDAY

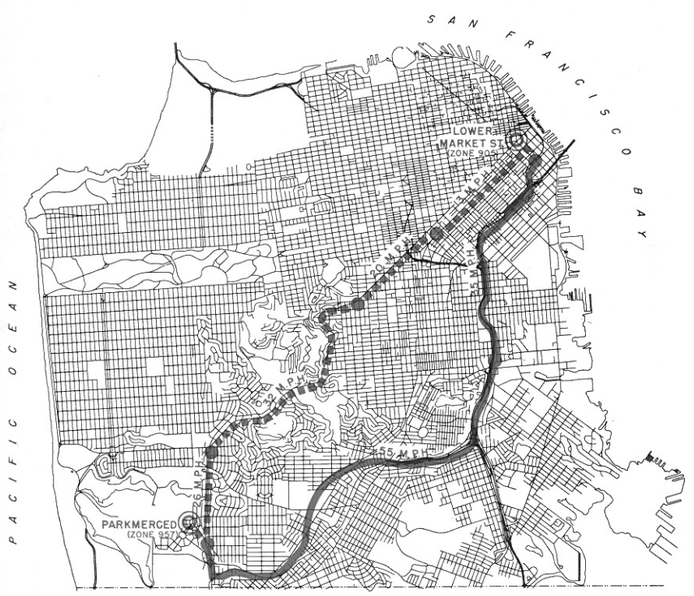


MAJOR DESIRE LINES - 1959
ALL VEHICULAR TRIPS
24 HOURS - NORMAL WEEKDAY



MAJOR DESIRE LINES - 197
ALL VEHICULAR TRIP
24 HOURS - NORMAL WEEKDA

The map below illustrates the example of the choice open to a Parkmerced resident going to Third and Market Streets. The quickest city street route would be via Junipero Serra Boulevard, Portola Drive, Market Street, Duboce Avenue, Mission and Third Streets to Market Street. The quickest freeway route in the network being tested would be via the Southern Freeway, the James Lick Memorial Freeway, the Beale Street ramp and Beale Street to Market Street and west on Market Street to Third Street. The proportion of traffic using each of these competitive routes was then computed and assigned. By combining such route comparisons from each of the 73 O-D zones to each of the other 72 zones, along with routes to and from suburban gateways, the volume predictions of traffic that would use the freeways were computed.



SHORTEST ROUTES
FREEWAY VS. CITY STREET
LOWER MARKET ST. TO PARKMERCED

EFFECTS OF PREDICTED CONGESTION

The first computation indicated the total number of drivers that would want to use the freeway route, assuming it were there. In some cases, this traffic demand greatly exceeded the capacity of the route, assuming a maximum practicable number of traffic lanes. Because congestion reduces freeway speeds in an overloaded section, some traffic will be diverted to an available alternate freeway with excess capacity over which typical speeds may be maintained, even though the distance to be traveled will be longer. Diversions of this type were taken into account in predicting the volume of traffic that will use a particular route of travel. For example: if the proposed extensions of the Southern and Embarcadero Freeways were now available, a considerable number of drivers would use them in preference to the already overloaded James Lick Memorial Freeway.

ESTIMATED DIVERSION TO RAPID TRANSIT

In all of the above computations, total vehicular volumes were based on the assumption that in 1975 the proportion of persons using private autos and public transit would be about the same as it is now. However, in view of the prospective development of rapid transit, computations were also made to measure the probable effect of rapid transit on vehicular traffic demands and to determine the extent to which the construction of a rapid transit system would reduce the need for freeways. Data relative to diversion from auto to rapid transit were supplied by the San Francisco Bay Area Rapid Transit District from its patronage estimate computations.

In these estimates it was assumed that:

1. The freeway system in existence in 1975 would consist only of those freeways already approved (Network 60).

2. The rapid transit system in operation in 1975 would include a Marin Line, a Twin Peaks Line and a Bayshore Line.

3. Rapid transit fares would be higher than those of local transit for a comparable trip, but transfers, available at the higher fare, would provide for a through ride.

Significant peak hour diversions to rapid transit are predicted for daily commuter trips into the city from suburban points as can be noted from the peak hour 1975 predicted flow charts in the network analyses later in this report. This reflects current deficiencies in suburban transit services and extensive present use of private autos in such commuter trips. Similar diversions to rapid transit are predicted for outlying portions of San Francisco that would be served by the assumed rapid transit network.

From inner areas in San Francisco, however, more modest diversions from use of autos to rapid transit are predicted, because:

1. More densely populated inner areas of San Francisco are characterized by lower-than-average per capita auto ownership.

2. These high density inner urban areas are also now characterized by a higher-than-average per capita utilization of existing public transit facilities.

3. In some cases, rapid transit would not provide a sufficient time advantage for short trips to generate a significant diversion from local transit or from use of autos.

Thus, while the proportion of people using both local and rapid transit from these inner areas in 1975 may well be higher than the proportion of suburban travelers into San Francisco using rapid transit, their diversion from autos to transit may be considerably less.

Since no rapid transit system has yet been authorized or financed, computations of vehicular traffic needs were made for two alternate situations: 1. assuming a rapid transit system would be in operation in 1975, and 2. assuming it would not.

FREEWAY ROUTES REVIEWED

This reappraisal compares six alternate freeway networks. As these networks have routes in common, the routes are described before each network as a whole is discussed.

THE WESTERN FREEWAY

Networks 10-40-80

This route would be considerably different from the project outlined in the current Trafficways Plan.

A landscaped depressed freeway needing little additional right-of-way would supplant Junipero Serra Boulevard from the county line to Ocean Avenue (1.4 miles). Existing local service streets would continue to serve as such and principal streets would cross on bridges. Beneath Junipero Serra Boulevard between Ocean Avenue and St. Francis Circle there would be a vehicular subway (0.4 miles) so that the complex street traffic movements of Ocean Avenue, Portola Drive, Sloat Boulevard and West Portal Avenue would be undisturbed. Its presence would not be visually apparent. A brief open-cut section for access ramps would connect the subway with a tunnel under Golden Gate Heights which would extend from Wawona Street to Laguna Honda Boulevard near Clarendon Avenue (1.1 miles). From this point, a depressed freeway between retaining walls and located between Sixth and Seventh Avenues would continue to Golden Gate Park (0.9 miles). One branch via a cut-and-cover subway would cross the park to the Park-Presidio Freeway (0.7 miles). The other branch via a subway under park drives would pass Kezar Stadium to the tier of blocks on the south side of the Park Panhandle (0.6 miles). A depressed freeway would border the Park Panhandle on the south, occupying the Oak Street frontage lots. East of the Panhandle it would occupy parts of the blocks between Fell and Oak Streets to a connection with the existing Central Freeway (1.5 miles).

Network 30

The Western Freeway would be the same as in Networks 10, 40 and 80 except that a tunnel (0.9 miles) under Mount Sutro and Parnassus Heights would be substituted for the portion from Laguna Honda Boulevard to the Park Panhandle. This change would result in two long tunnels between St. Francis Circle and the Park Panhandle, with a 500-foot long "strip of daylight" separating them in the Laguna Honda canyon. Because of the steepness of the hills in this area and the short open distance between portals, it would be necessary to place the junctions for the Laguna Honda Boulevard ramps within the tunnels.

THE CENTRAL FREEWAY

Networks 10-40-80

The Central Freeway would cross Van Ness Avenue near Turk Street, proceed below grade near Larkin Street and continue north as a depressed freeway crossing Van Ness Avenue again to Greenwich and Franklin Streets (1.8 miles).

Network 30

A minimum extension would carry the Central Freeway across Van Ness Avenue near Turk Street and connect with Post and O'Farrell Streets (0.5 miles).

GOLDEN GATE FREEWAY

Networks 10-80

This freeway could connect the Embarcadero Freeway at Broadway to the Richardson Avenue approach to the Golden Gate Bridge via an elevated single deck structure along The Embarcadero and North Point Street, a tunnel under Russian Hill (0.6 miles), and a depressed road near Greenwich Street west of Van Ness Avenue (1.2 miles).

Network 40

This route would be the same as Networks 10 and 80, except that it would extend only from the Embarcadero Freeway to a junction with the Central Freeway and the Tiburon Bridge approach near Greenwich Street west of Van Ness Avenue. No freeway west of this point to the Golden Gate Bridge would be built under Network 40.

PARK-PRESIDIO FREEWAY

Networks 10-40-50-80

The existing six-lane boulevard would be converted into a six-lane depressed landscaped freeway with overpasses at principal cross streets.

THE PRESIDIO HEIGHTS TUNNEL ROUTE

Network 30

This single route (2.6 miles) would substitute for the Golden Gate Freeway, Central Freeway and Park-Presidio Freeway. A tunnel 0.5 miles long under Anza Vista would extend from Fulton Street to the Geary Expressway and another tunnel of the same length would extend under Presidio Heights from California Street to a point opposite Lombard Street in the Presidio. A full freeway interchange would be necessary at the junction with the Western Freeway near Baker and Fell Streets. Access ramps would be located at the depressed freeway section between Presidio Avenue, Geary Expressway, Lyon and California Streets. In the Presidio, the route would traverse an area now occupied by temporary structures, would connect directly with the Golden Gate Bridge approach and provide ramp access to Lombard Street.

TIBURON BRIDGE

Network 40

The California State Division of San Francisco Bay Toll Crossings has taken the position that another bridge from San Francisco to Marin County will be needed within ten years. The Golden Gate Bridge and Highway District engineering consultant pointed out in a recent report the possible need for a second Marin Crossing in the foreseeable future. However, a recent study by the Department of City Planning, based on data provided by the Bridge and Highway District and by the San Francisco Bay Area Rapid Transit District, concluded that a second bridge to Marin County would not be needed by 1975, provided rapid transit to Marin County were in operation and provided arrangements are made to use four lanes on the bridge in the peak direction of flow.

While it is questionable that a second bridge to Marin County should be an actively considered project in the 1975 trafficways program, it has been included in one network for comparative purposes.

MISSION FREEWAY

Network 80

The Mission Freeway has been included in the Master Plan since 1945. It is not a part of the State Highway System and, in recent years, it has not been included in the city's annual six-year Capital Improvement Program. It has, however, been given consideration in current studies by inclusion in Network 80.

The Mission Freeway would start at the intersection of San Jose Avenue and the Southern Freeway and would utilize the existing Bernal Cut roadway of San Jose Avenue with little change. From the north end of Bernal Cut, it would be parallel to and east of Mission Street on an elevated or side-hill structure to a junction with the Central Freeway.

CROSSTOWN FREEWAY

Network 80

The Crosstown Freeway has been dropped from consideration as a freeway as the predicted traffic volumes can be accommodated conveniently by an improvement similar to that which was made to the Market-Portola route. (Such an improvement would include extending Bosworth Street to a connection with the Southern Freeway and an underpass at Portola Drive.)

SUNSET FREEWAY

Network 50

This is similar to the Alternate C route of the Wilbur Smith report on the Western Freeway. It is designed as a perimeter route which would go around the West of Twin Peaks district but bisect the Sunset district. At the county line, this route would connect with a Skyline Freeway in San Mateo County and would involve a 1.3-mile stretch of freeway at grade which would be in essence a reconstruction of the existing Skyline Boulevard through the Lake Merced and Harding Park area. A vehicular subway 0.6 miles long would carry the freeway under a perimeter street of the Country Club Acres subdivision and under Sloat Boulevard to emerge in the Sunset Boulevard parkway strip. Sunset Boulevard would be converted into a freeway for 1.7 miles to Golden Gate Park with interchanges at Taraval, Noriega and Judah Streets. Other streets would cross the freeway on bridges. It would be largely a depressed section with landscaped side slopes. With three traffic lanes in each direction, the roadway would occupy approximately the same area as the present park drives.

LINCOLN-FULTON FREEWAY

Network 50

The Lincoln-Fulton Freeway would consist of a pair of three-lane, one-way, depressed freeways separated by Golden Gate Park. To minimize the acquisition of residential frontage properties on Fulton Street and Lincoln Way, or having to take a strip of Golden Gate Park, the freeways would be depressed within retaining walls and partially roofed over for the support of either a ten-foot width of park land or one lane of the surface roads that would be needed to serve the Fulton Street and Lincoln Way frontages. The Lincoln Way portion would be 1.1 miles long and the Fulton Street portion 1.8 miles long. Two cross-park tunnels, one (southbound) from Fulton Street to Sunset Boulevard and the other (northbound) from Lincoln Way to Park-Presidio Boulevard, would connect these one-way freeways. Each would be 0.7 miles long.

Two vehicular subways, each with three lanes of one-way traffic, would be put under Golden Gate Park drives (one 0.2 miles long and the other 0.6 miles long) to connect with cantilevered depressed sections along Fell and Oak Streets, bordering the Park Panhandle. East of the Panhandle the freeway would be the same as the Western Freeway in Networks 10, 40 and 80.

PACIFIC HEIGHTS TUNNEL

Network 50

From the existing terminus of the Central Freeway at Franklin Street and Golden Gate Avenue, this route would consist of an interchange area (0.3 miles) leading to a tunnel portal near O'Farrell and Franklin Streets; two parallel bores of three lanes each (1.6 miles); an interchange near Richardson Avenue and Lombard Street; and a depressed freeway along Richardson Avenue to the Golden Gate Bridge approach. Connections with surface streets would be provided at Bush and Pine Streets and, possibly, at Broadway.

BROTHERHOOD WAY FREEWAY

Network 50

Since the Sunset Freeway would give direct service to Skyline Freeway serving western Daly City and Pacifica but not to Junipero Serra Freeway in San Mateo County, the Interstate System metropolitan loop route, a lateral route from the Sunset Freeway to the Southern Freeway was included in the proposals of the Mayor's Committee to Study Freeways. From an interchange near the entrance to Harding Park golf course, this route would supplant the drive on the west shore of Lake Merced, cross the lake on a bridge and follow the alignment of Brotherhood Way to the Southern Freeway. This could be built as a new parallel route, or the existing parkway drives could be converted into a freeway. This route would be 2.3 miles long, most of it freeway at grade.

Approved Freeways

The Southern Freeway from Junipero Serra Boulevard to James Lick Freeway is under construction, and final plans are being drawn by the State for its extension north to Army Street.

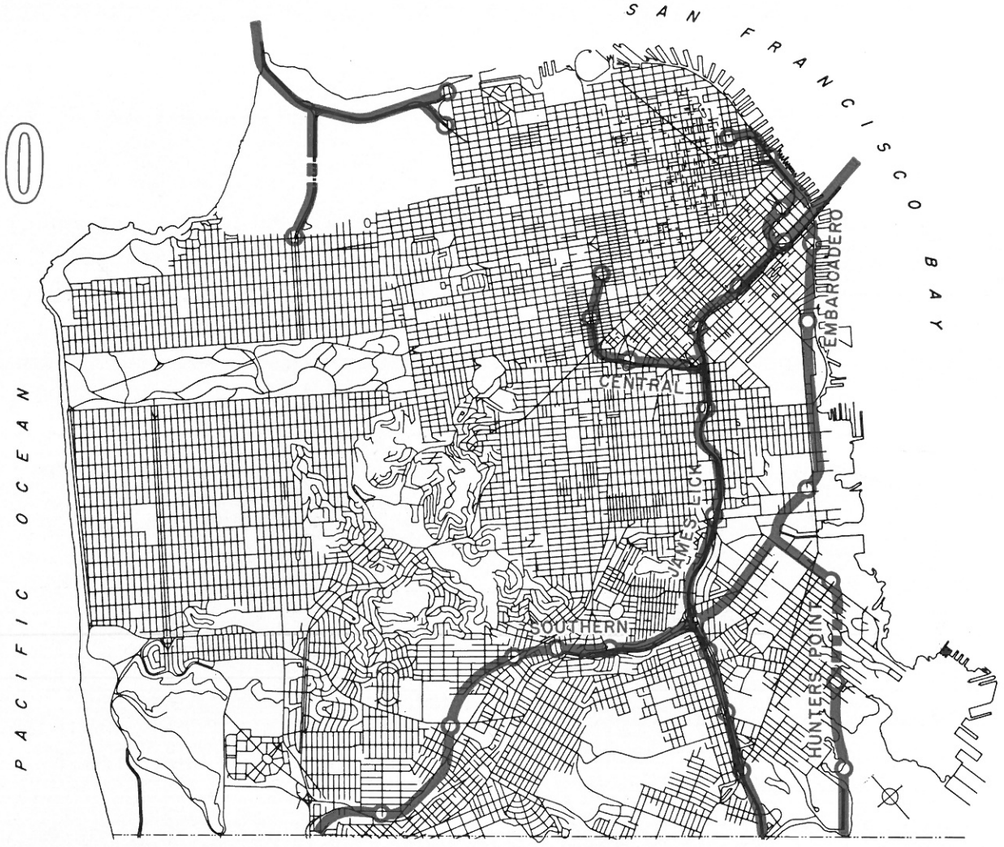
The Embarcadero Freeway from the Bay Bridge to Broadway is already built, and plans are being prepared by the State for its extension south to Army Street.

The Central Freeway from James Lick Freeway to Turk Street is already built.

The Park-Presidio Freeway and the *Golden Gate Freeway* are already built within the Presidio.

The Hunters Point Freeway from the county line just east of Candlestick Park would tunnel under the Hunters Point ridge to join the Southern Freeway extension near Evans Avenue.

TESTED ALTERNATE NETWORK 60



Network 60 is the system of freeways that will be in existence in San Francisco if no further action is taken to add any freeway routes to those presently authorized by the freeway resolution of the Board of Supervisors. It is analyzed here to determine if it will be adequate for the traffic volumes predicted for 1975 in San Francisco.

Details of construction characteristics, costs of construction and rights-of-way, and dwelling units to be moved from the rights-of-way are not discussed for Network 60 as for subsequent networks, since these sections of the Trafficways Plan are already approved, built, under construction or are definitely planned for future development. The components of Network 60 are included in each of the five other alternate networks.

The completion of Network 60 would add freeway traffic capacity along the city's southwestern and eastern perimeter. Without other freeways elsewhere in the city to share the load, a peak hour overload of serious proportions would be attracted to the completed projects. This overload would be serious even if a rapid transit system were completed and in operation by 1975.

DEFICIENCIES IN MAJOR TRAVEL CORRIDORS

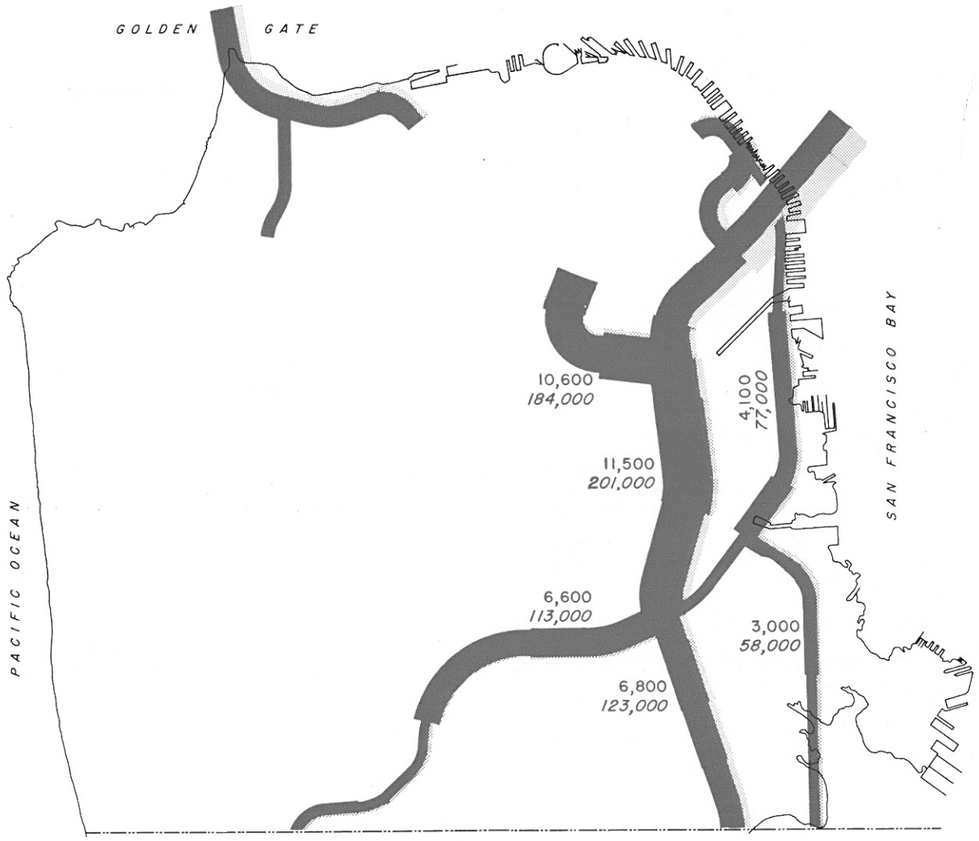
The main characteristic of Network 60 is that entrances into the city from the Peninsula and the East Bay to downtown would be served reasonably well, assuming there is a rapid transit system, but entrances from Marin County and traffic from many parts of western and northwestern San Francisco would be served by the same city streets system as they are now, a system that will be completely inadequate in 1975.

The Twin Peaks corridor, now served mainly by the Market-Portola route and some feeder or parallel routes, is now well balanced between street capacity and traffic demand. By 1975, however, a 50 to 75 per cent overload will result from the expected increase in traffic volumes.

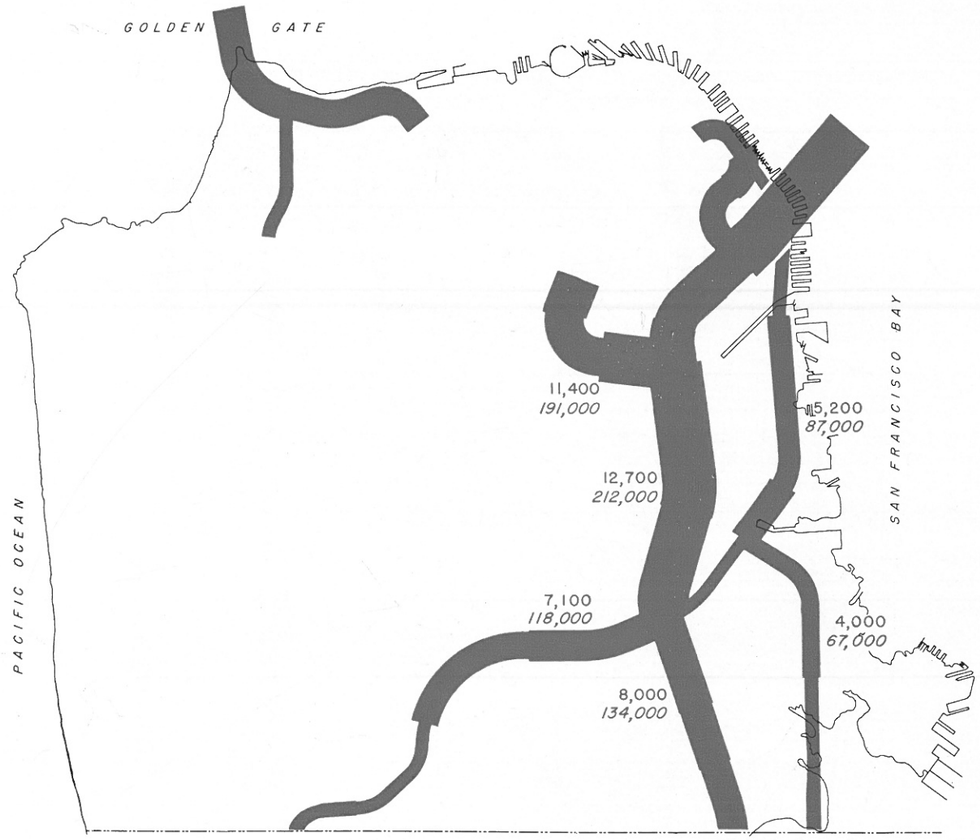
The Panhandle corridor, Fell and Oak Streets and parallel streets, will likewise see a 50 to 75 per cent overload by 1975 where there now exists a 15 to 20 per cent overload.

Similar overloads are predicted for the Marina corridor.

It is concluded that with Network 60 and no rapid transit, about eleven times as much congestion would exist in San Francisco in 1975 as now exists. With rapid transit, there would be about nine times as much. As congestion becomes more serious it becomes not just a peak hour problem but affects almost everyone at almost any time of the day.



PROJECTED 1975 TRAFFIC VOLUME WITH RAPID TRANSIT



PROJECTED 1975 TRAFFIC VOLUME WITHOUT RAPID TRANSIT

TRAFFIC DEFICIENCY OR SURPLUS

Comparison of Practical Capacity of Traffic Corridors in Network 60 with Traffic Volumes in 1960 and Predicted for 1975

CORRIDOR	ROUTE	Number of Lanes Each Direction	TRAFFIC DEFICIENCY OR SURPLUS, IN VEHICLES PER DAY*					
			1960 Conditions	Corridor Total	1975, Rapid Transit Operative	Corridor Total	1975, No Rapid Transit	Corridor Total
Third Street Corridor	Southern-Embarcadero Freeway Extensions Third Street	4 3	- 6,000	- 6,000	+ 71,000 + 18,000	+ 89,000	+ 54,000 + 16,000	+ 70,000
Bayshore Corridor	James Lick Freeway Bayshore Boulevard	4 3	-18,000 + 7,000	- 11,000	-132,000 + 18,000	- 114,000	-165,000 + 18,000	-147,000
Bernal Corridor	Mission Street, San Jose Avenue, etc.	5	+ 2,000	+ 2,000	+ 29,000	+ 29,000	+ 29,000	+ 29,000
SUBTOTAL, Third, Bayshore and Bernal Corridors				- 15,000		+ 4,000		- 48,000
Twin Peaks Corridor	Market-Portola and parallel Streets	4			- 32,000	- 32,000	- 34,000	- 34,000
Panhandle Corridor	Fell-Oak, Fulton and parallel Streets	8	-13,000	- 13,000	- 35,000	- 35,000	- 27,000	- 27,000
Western Addition Corridor	Geary Blvd., Post, Sutter, Pine, Bush & California Sts.	7	+11,000	+ 11,000	- 78,000	- 78,000	- 69,000	- 69,000
Marina Corridor	Marina Blvd., Lombard and parallel Streets	8	- 6,000	- 6,000	- 70,000	- 70,000	- 80,000	- 80,000
		TOTALS	Freeways-18,000 Streets - 5,000	- 23,000	Freeways - 61,000 Streets -150,000	- 211,000	Freeways - 111,000 Streets - 147,000	-258,000

*AT CORDON LINE AT ARMY STREET AND FILLMORE STREET "+" MEANS THAT CAPACITY EXCEEDS TRAFFIC VOLUMES "-" MEANS THAT CAPACITY IS LESS THAN TRAFFIC VOLUMES

TESTED ALTERNATE NETWORK 10

Network 10 includes modified alignments of much of the 1951 Trafficways Plan freeway pattern. It would add 13.0 miles of new freeway to Network 60 in a Western Freeway, a Park-Presidio Freeway, a Central Freeway and a Golden Gate Freeway. Types of construction proposed would include:

Cut-and-fill embankment	0.3 miles
Depressed route, landscaped slopes	2.3 miles
Depressed route, retaining walls	4.3 miles
Vehicular tunnels	2.4 miles
Vehicular subways	1.0 miles
Elevated interchange structures	0.7 miles
Elevated roadways	2.0 miles
Total	13.0 miles

This represents an estimated $289,000,000 expenditure at 1960 prices ($69,500,000 for right-of-way and $219,500,000 for construction costs).

Freeway Route	*Approximate Mileage*	*Total Costs*	*Right-of-Way Costs*	*Construction Costs*
Western	7.1	$173,000,000	$28,500,000	$144,500,000
Central	1.7	33,000,000	15,000,000	18,000,000
Golden Gate	3.3	81,000,000	26,000,000	55,000,000
Park-Presidio	0.9	2,000,000	—	2,000,000
Total	13.0	$289,000,000	$69,500,000	$219,500,000

TRAVEL MOVEMENTS SERVED

Network 10 gives direct service downtown for West of Twin Peaks area residents, and provides freeway service to all points for Russian Hill and Marina residents. It provides direct routes to downtown points for Marin County and Marina district residents via either the Golden Gate and Embarcadero Freeways or via the Golden Gate and Central Freeways. It gives a direct connection between the Golden Gate Bridge and the Bay Bridge via two alternate routes and between the Golden Gate Bridge and northwestern San Mateo County.

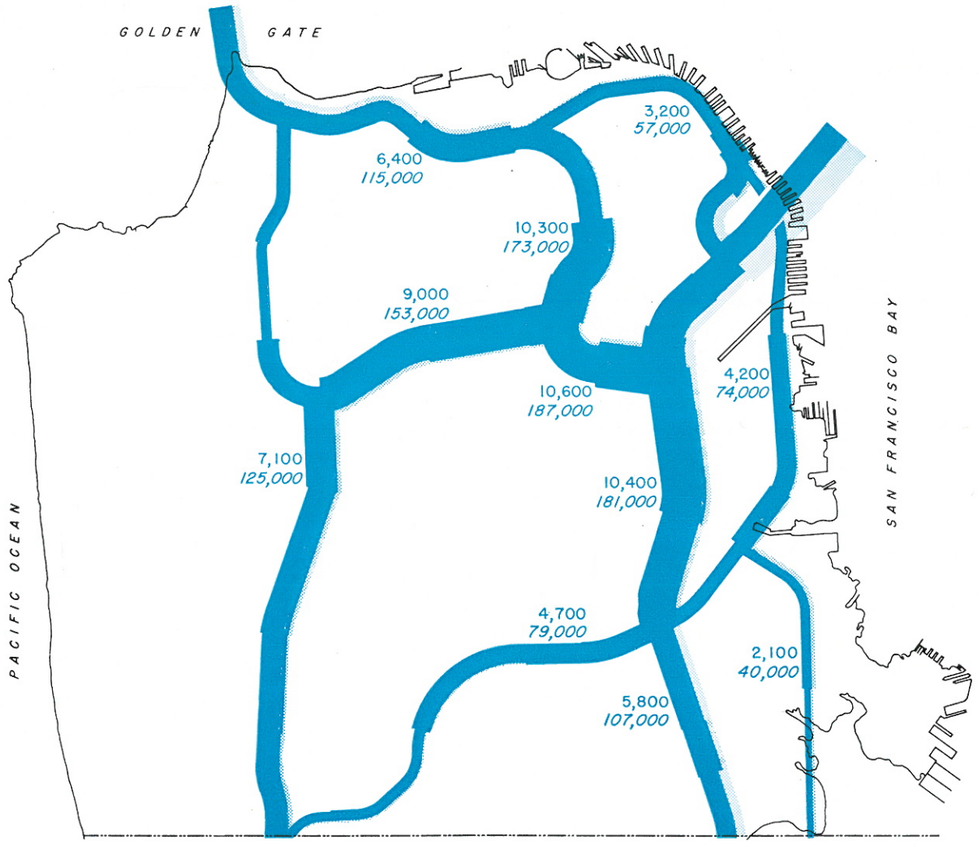
RIGHT-OF-WAY PROBLEMS

Some property acquisition is necessary in the Sixth-Seventh Avenue area. Through the Western Addition, the properties to be acquired are within a potential urban renewal area and route design could be incorporated into the plans of such a renewal project, where freeway expenditures could be considered as a credit for Federal project loans and grants.

The Central Freeway and the Golden Gate Freeway pose some serious right-of-way acquisition problems since they traverse high density apartment areas. In these areas, the possibilities of leasing air rights over freeways for new structures straddling the roadway could be explored. Vehicular subways under existing streets might be a possible alternative solution.

TRAFFIC SERVICE

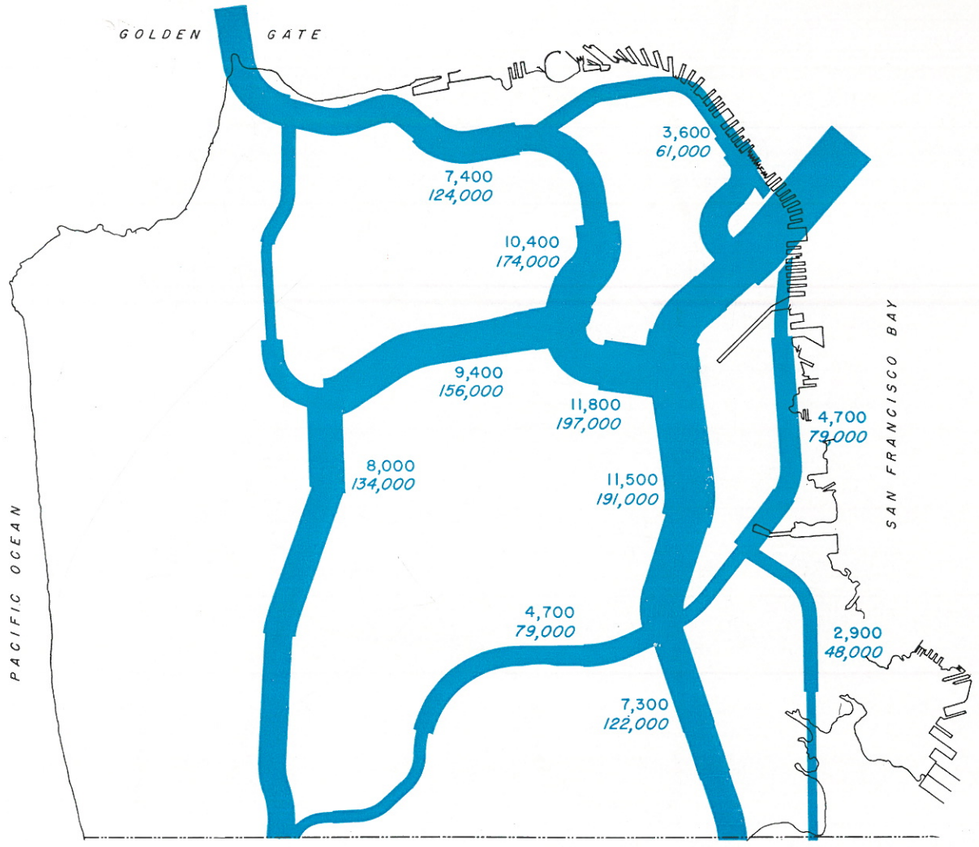
Except for Network 80, the 1951 Trafficways Plan, Network 10 shows one of the best predicted traffic distribution patterns of any of the proposed alternate networks. Problems of overloading during peak hours are indicated for James Lick Memorial Freeway and the Central Freeway near the Civic Center. However, with rapid transit and excess traffic capacity on major city streets, and with excess capacity on some alternate freeway routes (i.e., the Southern-Embarcadero as an alternate for James Lick, and the Embarcadero-Golden Gate as an alternate for the Central), Network 10 indicates it could serve 1975 traffic demands. Thus, any situations of congestion or overload predicted for peak hours in particular stretches of route would be balanced by excess capacity on alternate freeway routes in this system and by excess capacity on parallel major city streets. If rapid transit were in operation, this network would provide adequate traffic service.



Peak Hour Traffic Volume Scale
15,000
10,000
5,000

Traffic Volume on Freeway
Diversion to Rapid Transit
999 Peak Hour Volume on Freeway
999 Average Daily Volume on Freeway

PROJECTED 1975 TRAFFIC VOLUME WITH RAPID TRANSIT



Peak Hour Traffic Volume Scale
15,000
10,000
5,000

999 Peak Hour Volume on Freeway
999 Average Daily Volume on Freeway

PROJECTED 1975 TRAFFIC VOLUME WITHOUT RAPID TRANSIT

TRAFFIC DEFICIENCY OR SURPLUS

Comparison of Practical Capacity of Traffic Corridors in Network 10 with Predicted 1975 Traffic Volumes

CORRIDOR	ROUTE	Number of Lanes Each Direction	DEFICIENCY OR SURPLUS FOR 1975, IN VEHICLES PER DAY*			
			If Rapid Transit Operative	Corridor Total	If No Rapid Transit	Corridor Total
Third Street Corridor	Southern-Embarcadero Freeway Extensions Third Street	4 3	+ 81,000 + 8,000	+ 89,000	+ 66,000 + 8,000	+ 74,000
Bayshore Corridor	James Lick Freeway Bayshore Boulevard	4 3	- 106,000 + 14,000	- 92,000	- 134,000 + 13,000	- 121,000
Bernal Corridor	Mission Street, San Jose Avenue, etc.	5	+ 28,000	+ 28,000	+ 29,000	+ 29,000
SUBTOTAL, Third, Bayshore and Bernal Corridors				+ 25,000		- 18,000
Twin Peaks Corridor	Market-Portola and parallel Streets	4	+ 1,000	+ 1,000		
Panhandle Corridor	Western Freeway Fell-Oak, Fulton and parallel Streets	4 8	- 44,000 + 45,000	+ 1,000	- 60,000 + 47,000	- 13,000
Western Addition Corridor	Geary Boulevard, Post, Sutter, Pine, Bush and California Streets	7	- 26,000	- 26,000	- 24,000	- 24,000
Marina Corridor	Golden Gate Freeway Marina Boulevard, Lombard and parallel Streets	3 8	- 33,000 + 45,000	+ 12,000	- 50,000 + 45,000	- 5,000
		TOTALS	Freeways - 102,000 Streets + 115,000	+ 13,000	Freeways - 178,000 Streets + 118,000	- 60,000

*AT CORDON LINE AT ARMY STREET AND FILLMORE STREET "+" MEANS THAT CAPACITY EXCEEDS TRAFFIC VOLUMES "-" MEANS THAT CAPACITY IS LESS THAN TRAFFIC VOLUMES

TESTED ALTERNATE NETWORK 30

This is the "maximum tunnel and minimum mileage" freeway system, specifically designed to avoid problem areas in right-of-way acquisition, interference with community and neighborhood character, and to provide additional freeway connections for a total system within the city. This network would add to Network 60 a modified Western Freeway, a Presidio Heights Tunnel route, and a shortened Central Freeway to Post and O'Farrell Streets, near Larkin Street. Types of construction proposed would include:

Depressed route, landscaped slopes	1.4 miles
Depressed route, retaining walls	2.7 miles
Tunnels	3.8 miles
Vehicular subways	0.6 miles
Interchange structures	0.7 miles
Elevated structures	1.0 miles
Total	10.2 miles

Cost of this system would be somewhat less than for Network 10. Network 30 is estimated at 19 prices to cost $299,500,000 ($35,500,000 for right-of-way and $264,000,000 for construction cost

Freeway Route	*Approximate Mileage*	*Total Costs*	*Right-of-Way Costs*	*Constructio Costs*
Western	6.5	$207,000,000	$19,500,000	$187,500,0
Central	0.5	9,000,000	3,500,000	5,500,0
Presidio Heights . . .	2.6	73,000,000	10,000,000	63,000,0
Russian Hill Tunnel .	0.6	32,000,000	2,500,000	29,500,0
Total	10.2	$321,000,000	$35,500,000	$285,500,0

Russian Hill Tunnel and Marina Parkway. Two major improvements to the major thoroughfa system must be regarded as essential elements of this minimum freeway plan: a Russian Hill Tun from North Point Street near Columbus Avenue to Lombard Street just west of Van Ness Avenue to p vide better traffic service — particularly for trucks — between The Embarcadero and the Golden G Bridge; and development of Marina Boulevard as an express parkway, including its extension throu the Fort Mason area, to provide greater capacity for passenger autos from The Embarcadero to t Golden Gate Bridge. These improvements would compensate to some extent for the deletion, in t plan, of the Golden Gate Freeway.

TRAVEL MOVEMENTS SERVED

This network connects the Golden Gate Bridge with downtown, with southwestern San Francis and San Mateo County, and provides freeway connections for most interstate, intercity and interco munity movements needed in the city. It provides freeway ramps near Geary Boulevard and Presi Avenue to serve the Western Addition area, which the other networks do not.

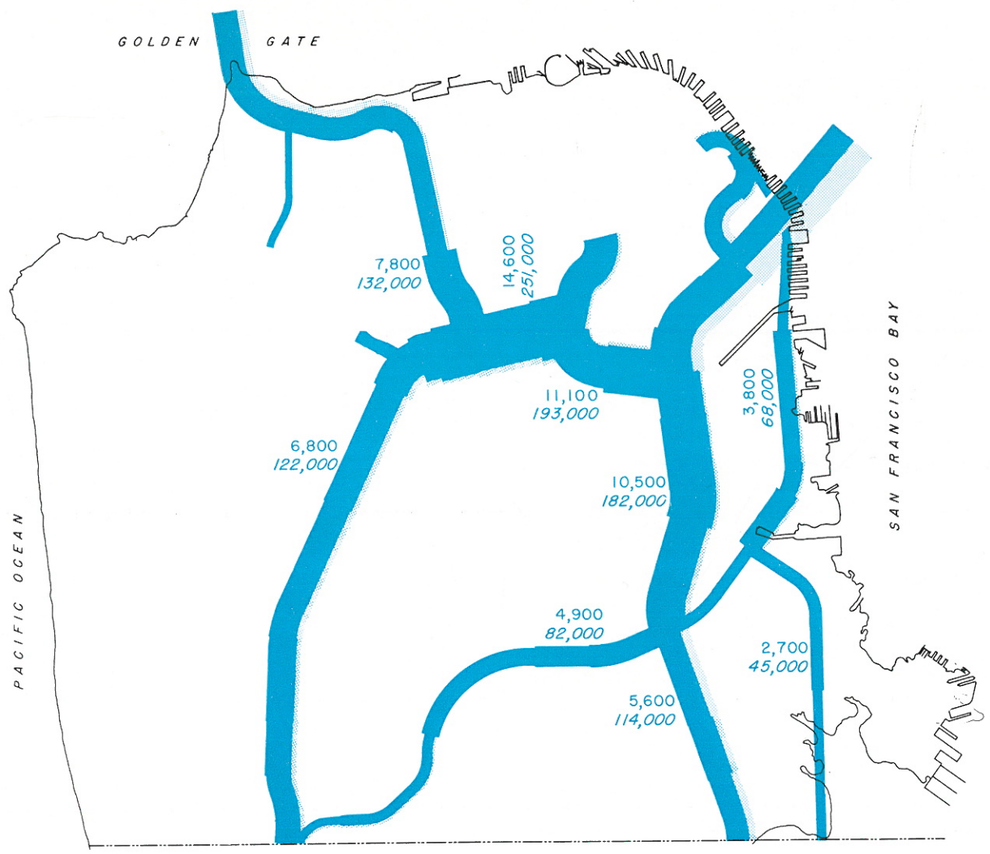
RIGHT-OF-WAY PROBLEMS

Three areas would be affected: 1. several blocks near Stanyan and Frederick Streets, at the sou east corner of Golden Gate Park, where the Parnassus Heights Tunnel east portal is located; 2. t junction point of the Western Freeway and the Presidio Heights Tunnel Freeway; 3. the five bloc between Geary Boulevard, California Street, Lyon Street and Presidio Avenue. These three areas, ho ever, may at a future date be declared to be parts of urban renewal project areas for redevelopment rehabilitation, in which case the freeway and redevelopment planning could be coordinated to se both purposes. The freeways then might be considered as a local improvement eligible in part a credit for Federal loans and grants for urban renewal.

TRAFFIC SERVICE

From the standpoint of predicted traffic service, Network 30 would have an extreme capac deficiency along the Western Freeway east of the Baker-Lyon interchange, where Peninsula and S Francisco traffic from the Western Freeway would join Marin and Marina traffic from the Presi Heights Tunnel Freeway. Estimates of 1975 peak hour volumes show that without rapid transit th would be a 60 to 70 per cent overload. Except for the Lombard Street and Marina Boulevard ma street facilities, there would be no alternate route to which traffic could be diverted. It is questiona whether freeway overloads could be as readily diverted to a city street system as they could to a para but slightly longer alternate freeway route. If rapid transit were in existence, this peak hour overlo would be reduced by about one-third leaving a peak hour overload of between 40 and 50 per cent.

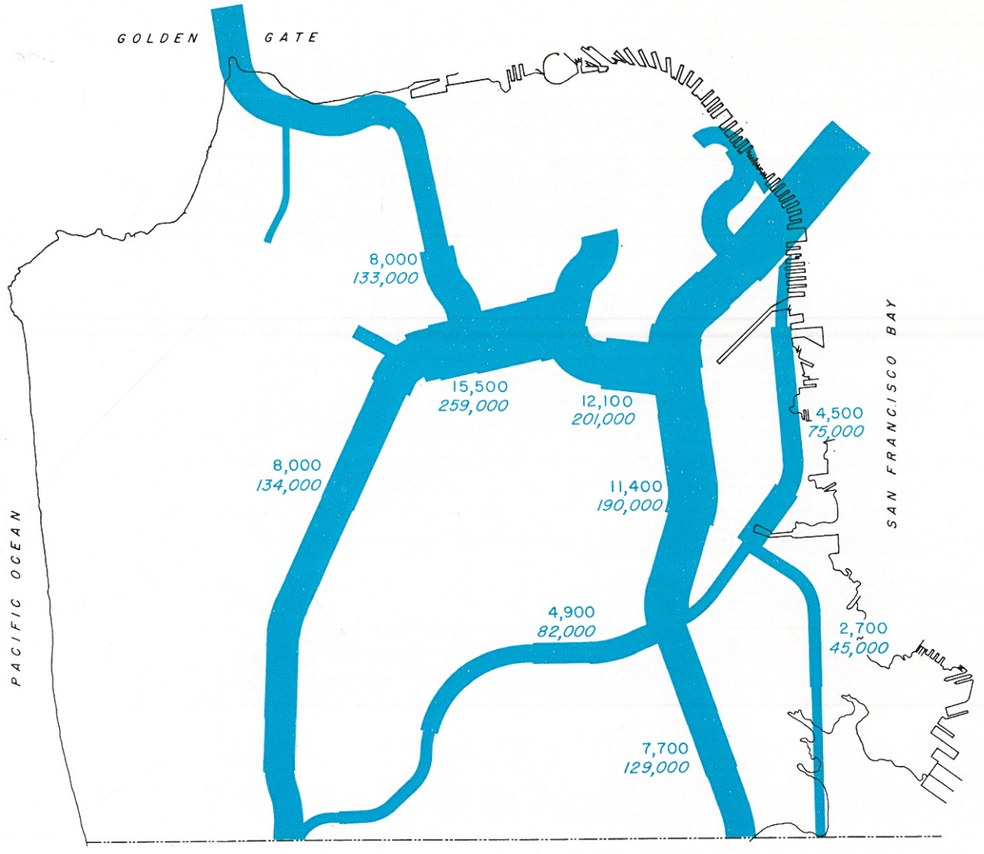
One solution would be to increase the number of lanes from Baker Street to the Central Freew by providing three four-lane roadways rather than two, with the center set of four lanes to be reversi or used only in the direction of heaviest movement during the peak hour. Such a design has been incor rated into a recently constructed freeway route in Seattle. It would, however, create complicati problems of weaving on-and-off ramps at interchanges. It might be necessary to widen the existi Central Freeway to provide needed capacity. The analysis of corridor capacity deficiencies illustra the consequences of too few freeway routes.



Peak Hour Traffic Volume Scale
15,000
10,000
5,000

Traffic Volume on Freeway
Diversion to Rapid Transit
999 Peak Hour Volume on Freeway
999 Average Daily Volume on Freeway

PROJECTED 1975 TRAFFIC VOLUME WITH RAPID TRANSIT



Peak Hour Traffic Volume Scale
15,000
10,000
5,000

999 Peak Hour Volume on Freeway
999 Average Daily Volume on Freeway

PROJECTED 1975 TRAFFIC VOLUME WITHOUT RAPID TRANSIT

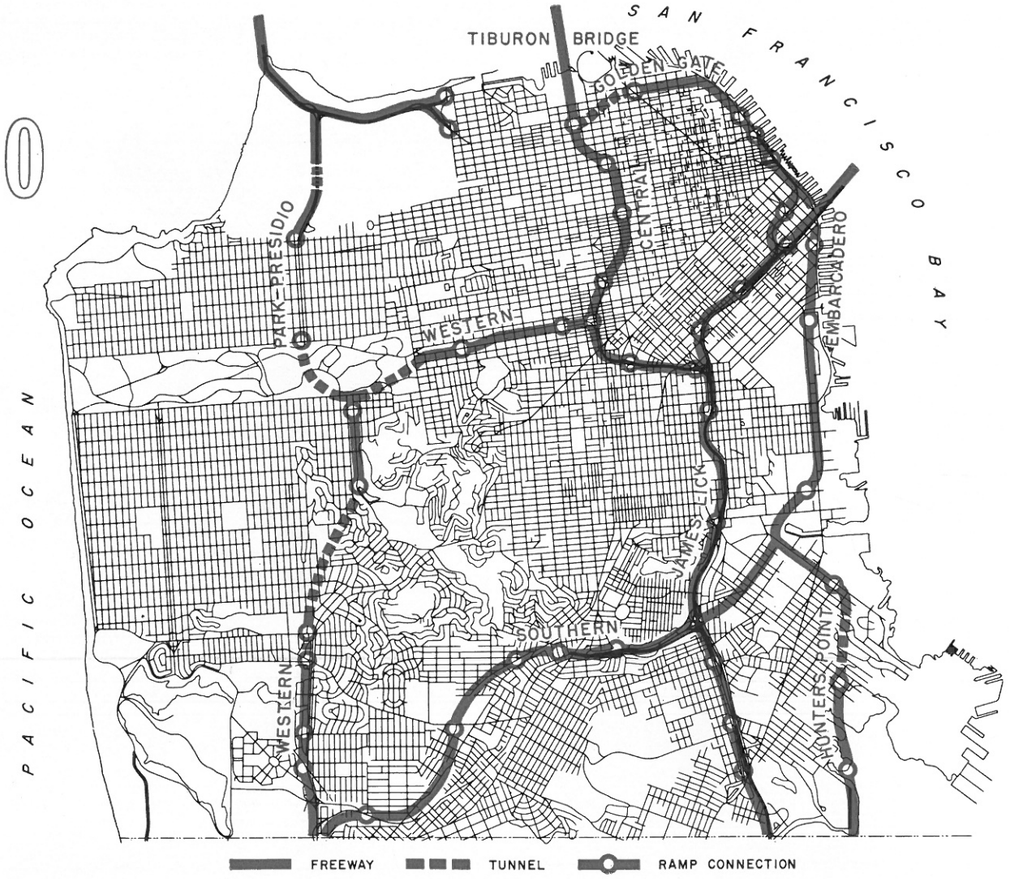
TRAFFIC DEFICIENCY OR SURPLUS

Comparison of Practical Capacity of Traffic Corridors in Network 30 with Predicted 1975 Traffic Volumes

CORRIDOR	ROUTE	Number of Lanes Each Direction	DEFICIENCY OR SURPLUS FOR 1975, IN VEHICLES PER DAY*			
			If Rapid Transit Operative	Corridor Total	If No Rapid Transit	Corridor Total
Third Street Corridor	Southern-Embarcadero Freeway Extensions Third Street	4 3	+ 69,000 + 16,000	+ 85,000	+ 53,000 + 16,000	+ 69,000
Bayshore Corridor	James Lick Freeway Bayshore Boulevard	4 3	- 97,000 + 18,000	- 79,000	- 124,000 + 18,000	- 106,000
Bernal Corridor	Mission Street, San Jose Avenue, etc.	5	+ 30,000	+ 30,000	+ 31,000	+ 31,000
SUBTOTAL, Third, Bayshore and Bernal Corridors				+ 36,000		- 6,000
Twin Peaks Corridor	Market-Portola and parallel Streets	4	+ 9,000	+ 9,000	+ 10,000	+ 10,000
Panhandle Corridor	Western Freeway and Presidio Heights Tunnel Fell-Oak, Fulton and parallel Streets	4 8	- 142,000 + 41,000	- 101,000	- 163,000 + 43,000	- 120,000
Western Addition Corridor	Geary Boulevard, Post, Sutter, Pine, Bush and California Streets	7	- 7,000	- 7,000	9,000	- 9,000
Marina Corridor	Marina Boulevard, Lombard and parallel Streets	8	- 17,000	- 17,000	- 19,000	- 19,000
		TOTALS	Freeways -170,000 Streets + 90,000	- 80,000	Freeways -234,000 Streets + 90,000	-144,000

*AT CORDON LINE AT ARMY STREET AND FILLMORE STREET "+" MEANS THAT CAPACITY EXCEEDS TRAFFIC VOLUMES "-" MEANS THAT CAPACITY IS LESS THAN TRAFFIC VOLUMES

TESTED ALTERNATE NETWORK 40



Network 40 is essentially a modification of Network 10, oriented toward the location of the second Bay crossing to Marin County, assumed to be located in the general vicinity of Fort Mason, and generally referred to as the Tiburon Bridge. It would consist of a Western Freeway, a Tiburon Bridge, a Central Freeway which would continue north to connect with a Tiburon Bridge, and a Golden Gate Freeway connecting the Embarcadero Freeway with the Central Freeway. Inasmuch as most Central Freeway and Embarcadero Freeway traffic would use the bridge at Fort Mason rather than travel through the Marina to the Golden Gate Bridge, the Golden Gate Freeway west of Gough Street would not be necessary. Park-Presidio Boulevard, Lombard Street and Marina Boulevard would be adequate for the remaining Golden Gate Bridge traffic, once a Tiburon Bridge were built.

Network 40 would add 11.0 miles of freeway to the presently approved system and types of construction proposed would include:

Cut-and-fill embankment	0.3 miles
Depressed route, landscaped slopes	1.4 miles
Depressed route, retaining walls	3.2 miles
Vehicular tunnels	2.4 miles
Vehicular subways	1.0 miles
Elevated interchange structures	0.7 miles
Elevated roadways	2.0 miles
Total	11.0 miles

This represents an estimated $262,500,000 expenditure at 1960 prices ($55,500,000 for right-of-way and $207,000,000 for construction costs).

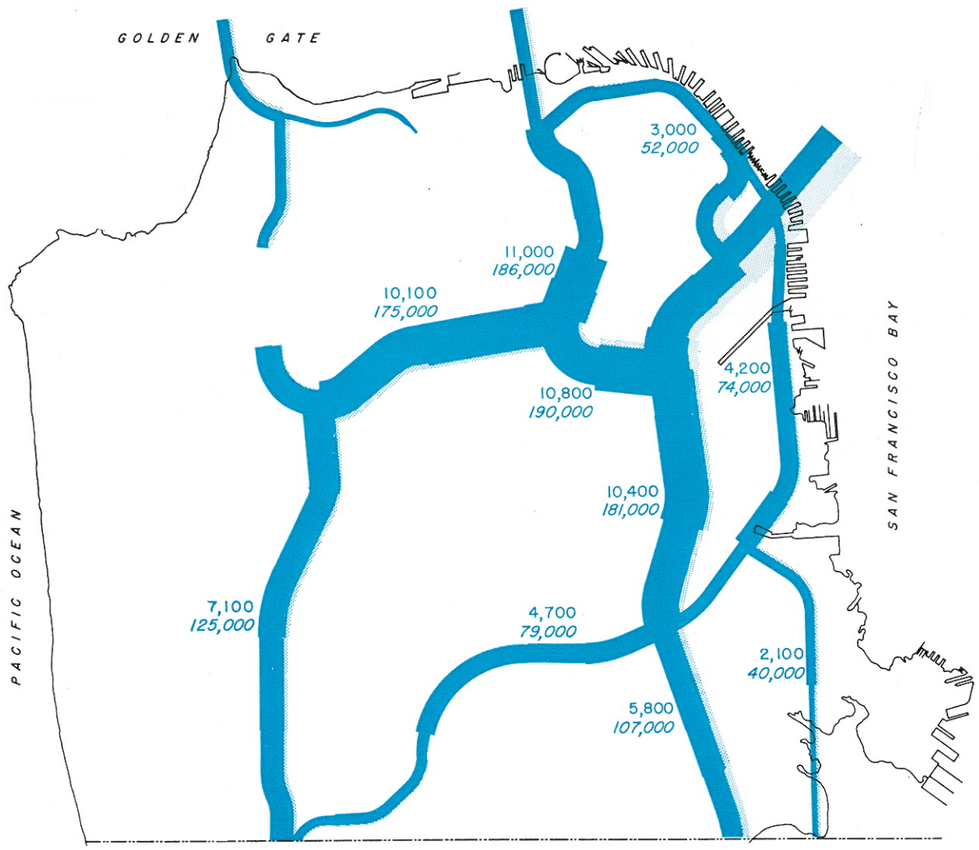
Freeway Route	*Approximate Mileage*	*Total Costs*	*Right-of-Way Costs*	*Construction Costs*
Western	7.1	$173,000,000	$28,500,000	$144,500,000
Central	1.8	38,500,000	19,500,000	19,000,000
Golden Gate	2.1	51,000,000	7,500,000	43,500,000
Total	11.0	$262,500,000	$55,500,000	$207,000,000

RIGHT-OF-WAY PROBLEMS

These would be the same as in Network 10, except that property acquisition problems in the Marina west of Gough Street would be obviated by the elimination of that portion of the Golden Gate Freeway. Acquisition problems of the Central Freeway would still exist.

TRAFFIC SERVICE

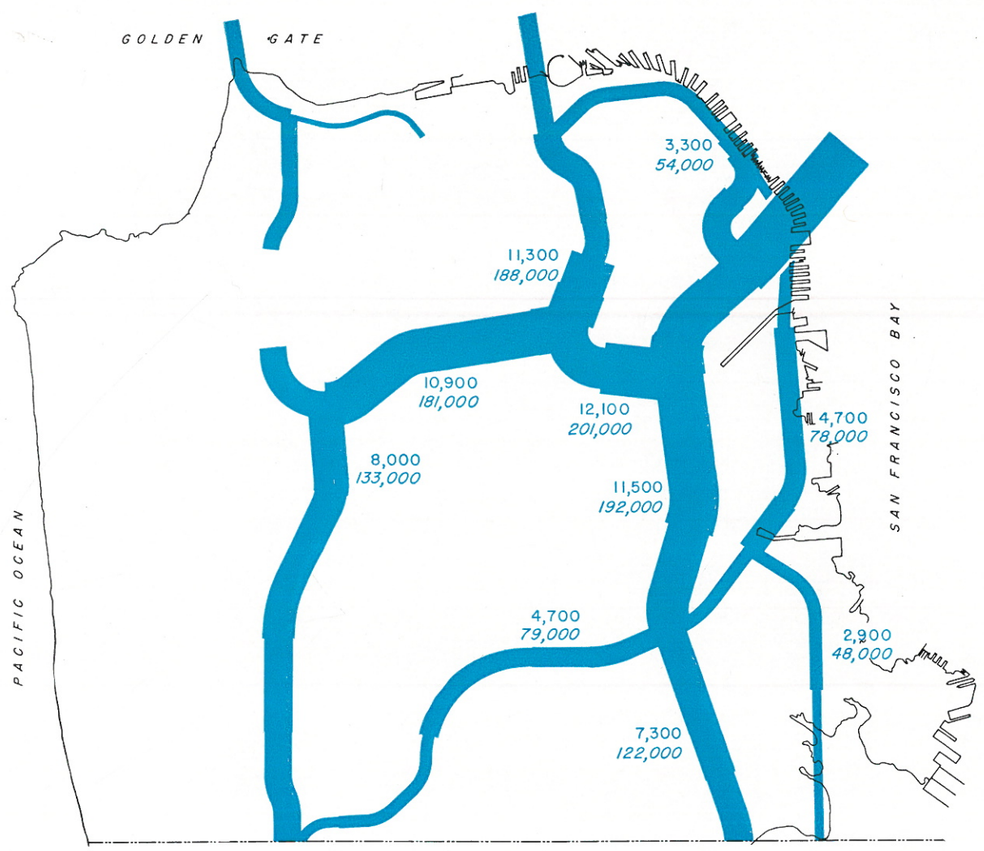
The predicted 1975 traffic pattern is similar to that of Network 10, except that total freeway deficiencies are less. A greater traffic load would be thrown on the existing major city streets in the Marina district by the elimination of the western half of the Golden Gate Freeway. In the Panhandle corridor, freeway capacity deficiencies of a magnitude that cannot be balanced by extra capacity on city streets would occur on the Western Freeway. Problem areas of the James Lick Freeway, the Western Freeway and the Central Freeway show slightly more peak hour congestion than is shown in Network 10.



Peak Hour Traffic Volume Scale
15,000
10,000
5,000

Traffic Volume on Freeway
Diversion to Rapid Transit
999 Peak Hour Volume on Freeway
999 Average Daily Volume on Freeway

PROJECTED 1975 TRAFFIC VOLUME WITH RAPID TRANSIT



Peak Hour Traffic Volume Scale
15,000
10,000
5,000

999 Peak Hour Volume on Freeway
999 Average Daily Volume on Freeway

PROJECTED 1975 TRAFFIC VOLUME WITHOUT RAPID TRANSIT

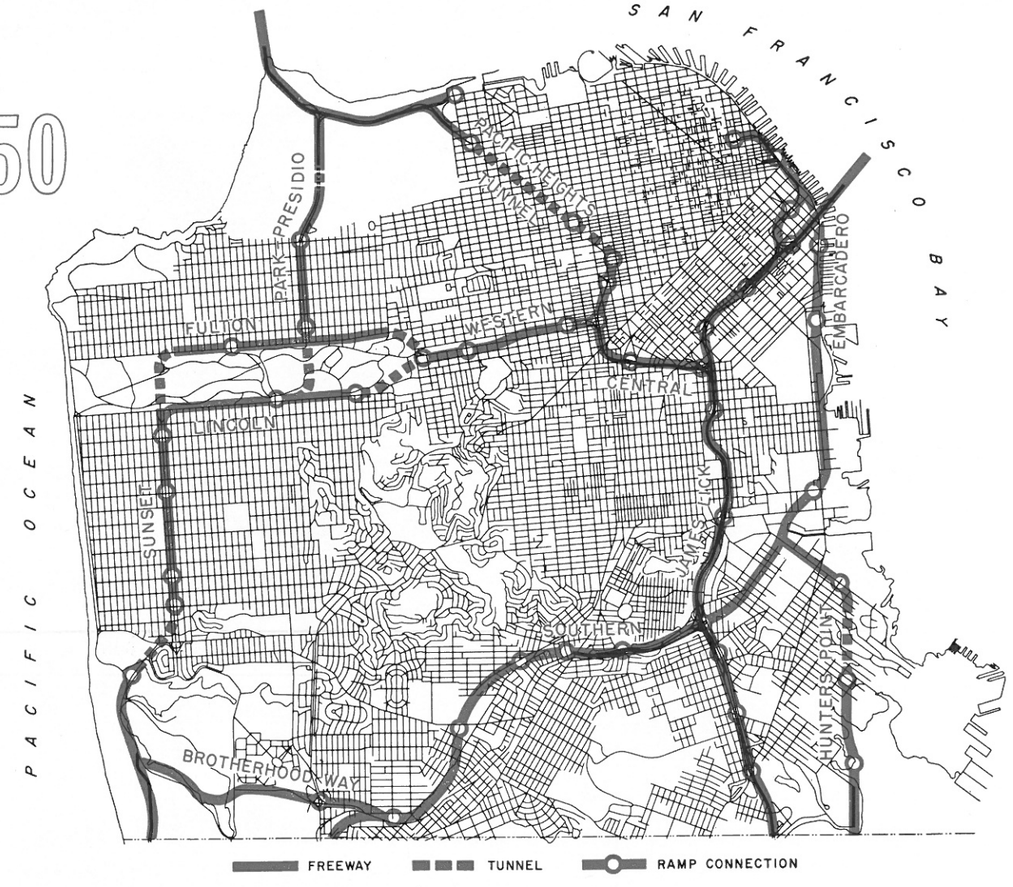
TRAFFIC DEFICIENCY OR SURPLUS

Comparison of Practical Capacity of Traffic Corridors in Network 40 with Predicted 1975 Traffic Volumes

CORRIDOR	ROUTE	Number of Lanes Each Direction	DEFICIENCY OR SURPLUS FOR 1975, IN VEHICLES PER DAY*			
			If Rapid Transit Operative	Corridor Total	If No Rapid Transit	Corridor Total
Third Street Corridor	Southern-Embarcadero Freeway Extensions Third Street	4 3	+ 81,000 + 8,000	+ 89,000	+ 66,000 + 8,000	+ 74,000
Bayshore Corridor	James Lick Freeway Bayshore Boulevard	4 3	- 106,000 + 14,000	- 92,000	- 134,000 + 13,000	- 121,000
Bernal Corridor	Mission Street, San Jose Avenue, etc.	5	+ 28,000	+ 28,000	+ 29,000	+ 29,000
SUBTOTAL, Third, Bayshore and Bernal Corridors				+ 25,000		- 18,000
Twin Peaks Corridor	Market-Portola and parallel Streets	4	+ 1,000	+ 1,000		
Panhandle Corridor	Western Freeway Fell-Oak, Fulton and parallel Streets	4 8	- 67,000 + 45,000	- 22,000	- 87,000 + 47,000	- 40,000
Western Addition Corridor	Geary Boulevard, Post, Sutter, Pine, Bush and California Streets	7	- 26,000	- 26,000	- 24,000	- 24,000
Marina Corridor	Tiburon Bridge Approach 3 Marina Boulevard, Lombard and parallel Streets	3 8	+ 28,000 - 10,000	+ 18,000	+ 10,000 - 7,000	+ 3,000
		TOTALS	Freeways - 64,000 Streets + 60,000	- 4,000	Freeways - 145,000 Streets + 66,000	- 79,000

*AT CORDON LINE AT ARMY STREET AND FILLMORE STREET "+" MEANS THAT CAPACITY EXCEEDS TRAFFIC VOLUMES "-" MEANS THAT CAPACITY IS LESS THAN TRAFFIC VOLUMES

TESTED ALTERNATE NETWORK 50



Network 50 was developed to test an integrated freeway network incorporating two separately proposed projects: the Sunset-Lincoln-Fulton Freeway system put forward by the Mayor's Committee to Study Freeways and the Pacific Heights Tunnel proposed by Supervisor William Blake. An 0.8 mile section of the depressed Western Freeway along the Panhandle was added to these two projects to connect them and to provide a continuous system. The main characteristic of Network 50 is that in almost every case (except for the approved freeways) the routes are different from those in the 1951 Trafficways Plan. For instance, the Sunset Freeway and the Lincoln-Fulton Freeway are substituted for the Western Freeway, and the Pacific Heights Tunnel is substituted for the Golden Gate Freeway and the Central Freeway. This network also includes, in accordance with the majority committee report, the Park-Presidio Freeway.

A total of 17.6 miles of freeway would be added to the Network 60 system if Network 50 were adopted. Types of construction proposed would include:

WESTERN, SUNSET, PARK-PRESIDIO FREEWAYS

Freeways at grade	2.8 miles
Depressed routes, landscaped slopes	4.3 miles
Depressed routes, retaining walls	1.6 miles
Depressed, cantilevered design	3.5 miles
Vehicular subways	2.6 miles
Elevated interchange structures	0.6 miles
Total	15.4 miles

PACIFIC HEIGHTS TUNNEL

Depressed route, retaining walls	0.3 miles
Vehicular tunnel	1.6 miles
Elevated roadway	0.3 miles
Total	2.2 miles

The cost of Network 50, estimated at 1960 prices, is $328,000,000 ($43,500,000 for right-of-way and $284,500,000 for construction costs).

Freeway Route	*Approximate Mileage*	*Total Costs*	*Right-of-Way Costs*	*Construction Costs*
Sunset, Fulton-Lincoln, Western-Panhandle . .	14.5	$164,000,000	$30,500,000	$133,500,000
Park-Presidio	0.9	2,000,000	—	2,000,000
Pacific Heights	2.2	162,000,000	13,000,000	149,000,000
Total	17.6	$328,000,000	$43,500,000	$284,500,000

TRAVEL MOVEMENTS SERVED

The main characteristic of Network 50 is that it serves some traffic streams directly which have relatively small volumes (i.e., from Pacifica and the western Sunset district to downtown), and that, like Network 30, it serves some large-volume traffic movements well but in a less direct manner than Network 10.

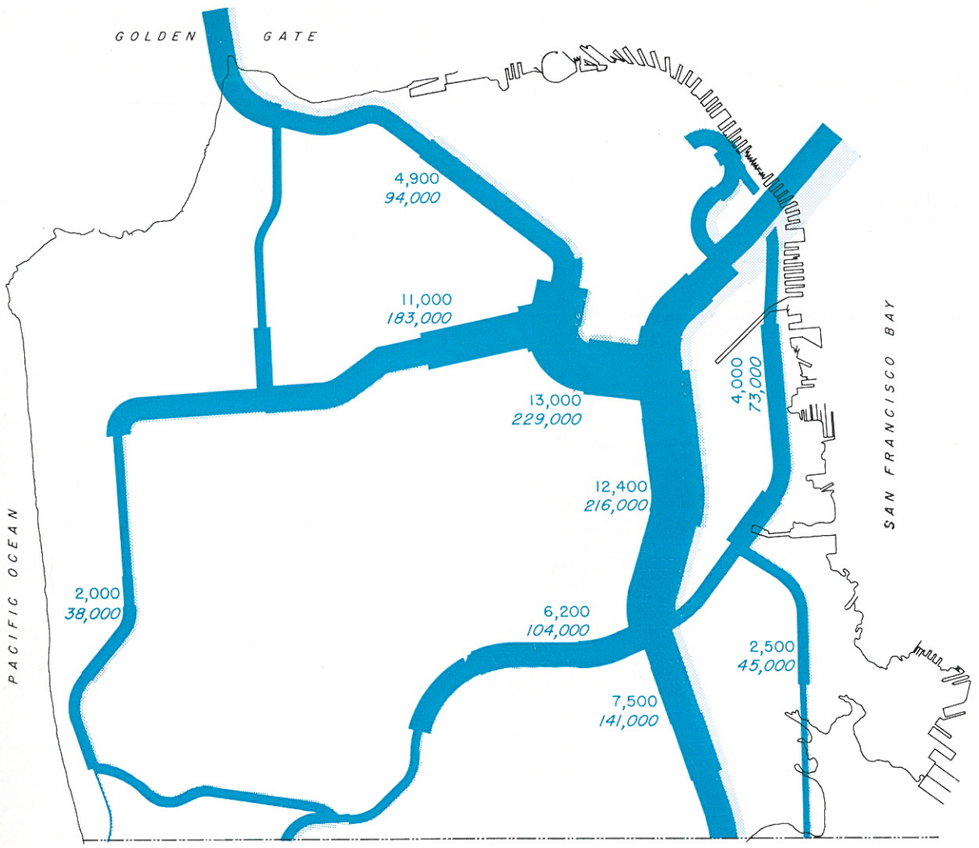
TRAFFIC SERVICE

The Sunset Freeway would attract about one-third as much traffic as the Western Freeway. This would mean that the capacity loads now carried by major city streets, such as Nineteenth Avenue, through the West of Twin Peaks and Sunset districts would not be reduced to the same extent as they would if a Western Freeway were built. It would not take the traffic congestion off the city streets, one of the principal objectives of a freeway system. Also, a Sunset route would provide little freeway service to the West of Twin Peaks area. The lack of a Western Freeway, for accommodation of traffic from the Junipero Serra Freeway south of San Francisco, would result in a tremendous overload on the James Lick Freeway.

The Pacific Heights Tunnel would provide fairly direct freeway service for Golden Gate Bridge traffic and for some portions of the Marina district to the downtown area.

From a traffic volume standpoint, however, extreme congestion would arise on the Central Freeway, where peak hour volumes would be roughly twice that artery's capacity. At the Bush-Pine interchange, the same conditions would occur because of insufficient capacity on the streets to which it would connect.

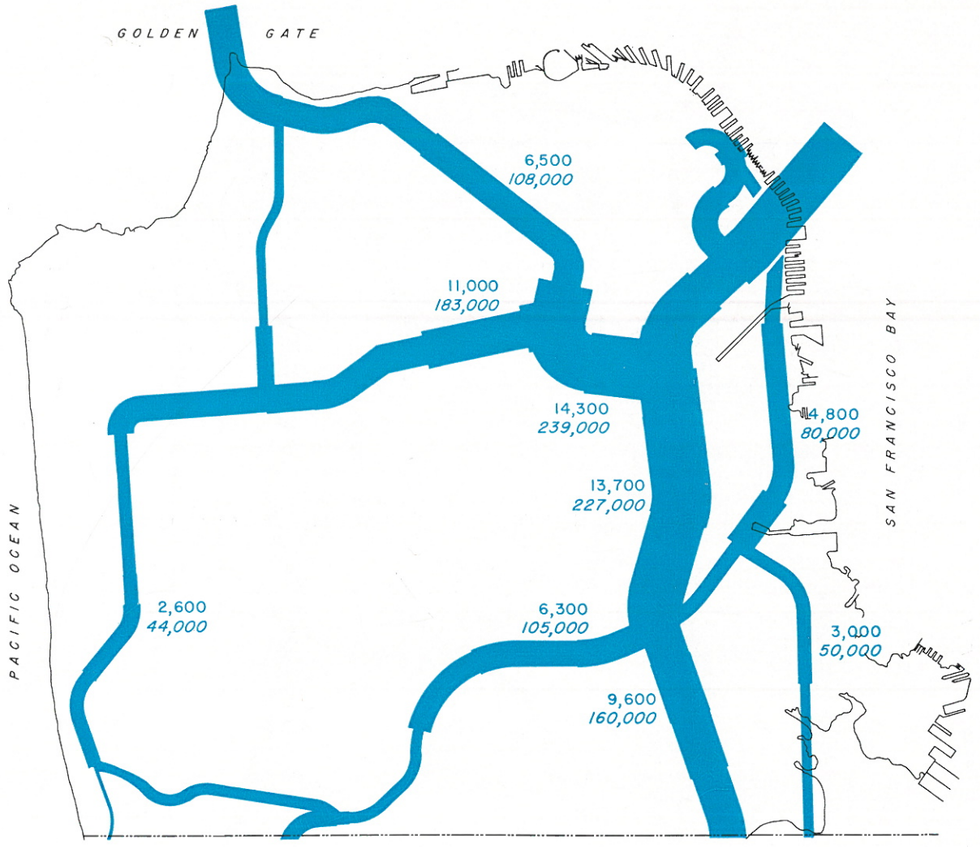
Estimates of predicted capacity deficiencies indicate problems of congestion as serious as in Network 30. The Third Street, Bayshore and Bernal corridors would be considerably more congested than they would in Networks 10, 30 and 40, a reflection of the more circuitous routing of the Sunset Freeway compared to the more direct routing of the Western Freeway. The Twin Peaks corridor also would be more congested, attributable to the lack of a direct Western Freeway. The Panhandle corridor would have a capacity deficiency greater than for Network 10 but not as great as for Network 30. The Western Addition corridor would have a greater capacity than it would in either Networks 10 or 30. Traffic service for the Marina corridor, however, would be in good balance.



Peak Hour Traffic Volume Scale
15,000
10,000
5,000

Traffic Volume on Freeway
Diversion to Rapid Transit
999 Peak Hour Volume on Freeway
999 Average Daily Volume on Freeway

PROJECTED 1975 TRAFFIC VOLUME WITH RAPID TRANSIT



Peak Hour Traffic Volume Scale
15,000
10,000
5,000

999 Peak Hour Volume on Freeway
999 Average Daily Volume on Freeway

PROJECTED 1975 TRAFFIC VOLUME WITHOUT RAPID TRANSIT

TRAFFIC DEFICIENCY OR SURPLUS

Comparison of Practical Capacity of Traffic Corridors in Network 50 with Predicted 1975 Traffic Volumes

CORRIDOR	ROUTE	Number of Lanes Each Direction	DEFICIENCY OR SURPLUS FOR 1975, IN VEHICLES PER DAY*			
			If Rapid Transit Operative	Corridor Total	If No Rapid Transit	Corridor Total
Third Street Corridor	Southern-Embarcadero Freeway Extensions Third Street	4 3	+ 66,000 + 17,000	+ 83,000	+ 51,000 + 16,000	+ 67,000
Bayshore Corridor	James Lick Freeway Bayshore Boulevard	4 3	- 132,000 + 17,000	- 115,000	- 168,000 + 18,000	- 150,000
Bernal Corridor	Mission Street, San Jose Avenue, etc.	5	+ 35,000	+ 35,000	+ 36,000	+ 36,000
SUBTOTAL, Third, Bayshore and Bernal Corridors				+ 3,000		- 47,000
Twin Peaks Corridor	Market-Portola and parallel Streets	4	- 8,000	- 8,000	- 10,000	- 10,000
Panhandle Corridor	Sunset Freeway Fell-Oak, Fulton and parallel Streets	4 8	- 75,000 + 38,000	- 37,000	- 82,000 + 41,000	- 41,000
Western Addition Corridor	Geary Boulevard, Post, Sutter, Pine, Bush and California Streets	7	- 46,000	- 46,000	- 46,000	- 46,000
Marina Corridor	Pacific Heights Tunnel Marina Boulevard, Lombard and parallel Streets	3 8	- 12,000 + 26,000	+ 14,000	- 34,000 + 30,000	- 4,000
		TOTALS	Freeways - 153,000 Streets + 79,000	- 74,000	Freeways -233,000 Streets + 85,000	- 148,000

*AT CORDON LINE AT ARMY STREET AND FILLMORE STREET "+" MEANS THAT CAPACITY EXCEEDS TRAFFIC VOLUMES "-" MEANS THAT CAPACITY IS LESS THAN TRAFFIC VOLUMES

TESTED ALTERNATE NETWORK 80

Network 80 is the 1951 Trafficways Plan which is included here as a means of making test comparisons with the other networks on traffic served and overall balance of traffic demand, capacity and deficiencies. In essence, Network 80 is Network 10 plus the Crosstown Freeway and the Mission Freeway. The Crosstown Freeway is included in the traffic volume estimates but is not included in the freeway mileage or cost estimates as it is currently planned as a major thoroughfare.

Network 80 would add 15.8 miles of freeways to Network 60. Types of construction proposed would include:

Cut-and-fill embankment	0.3 miles
Depressed route, landscaped slopes	3.5 miles
Depressed route, retaining walls	4.3 miles
Vehicular tunnels	2.4 miles
Vehicular subways	1.0 miles
Elevated interchanges	0.7 miles
Elevated roadways	3.6 miles
Total	15.8 miles

The total cost of Network 80 is $348,000,000 or $59,000,000 more than Network 10, the difference being the cost of the Mission Freeway.

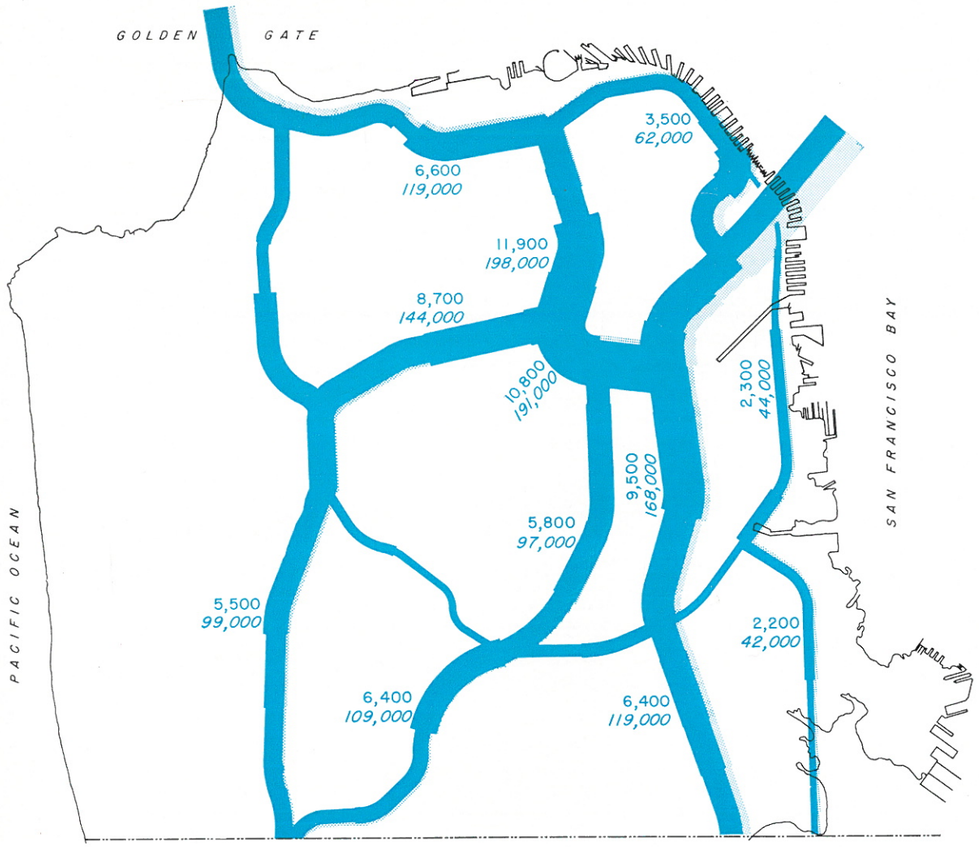
Freeway Route	*Approximate Mileage*	*Total Costs*	*Right-of-Way Costs*	*Construction Costs*
Western	7.1	$173,000,000	$28,500,000	$144,500,000
Central	1.7	33,000,000	15,000,000	18,000,000
Golden Gate	3.3	81,000,000	26,000,000	55,000,000
Park-Presidio	0.9	2,000,000	—	2,000,000
Mission	2.8	59,000,000	20,000,000	39,000,000
Total	15.8	$348,000,000	$89,500,000	$258,500,000

RIGHT-OF-WAY PROBLEMS

The land needed for a Mission Freeway is intensely developed with a high population density and a high land value. It also includes many business establishments.

TRAFFIC SERVICE

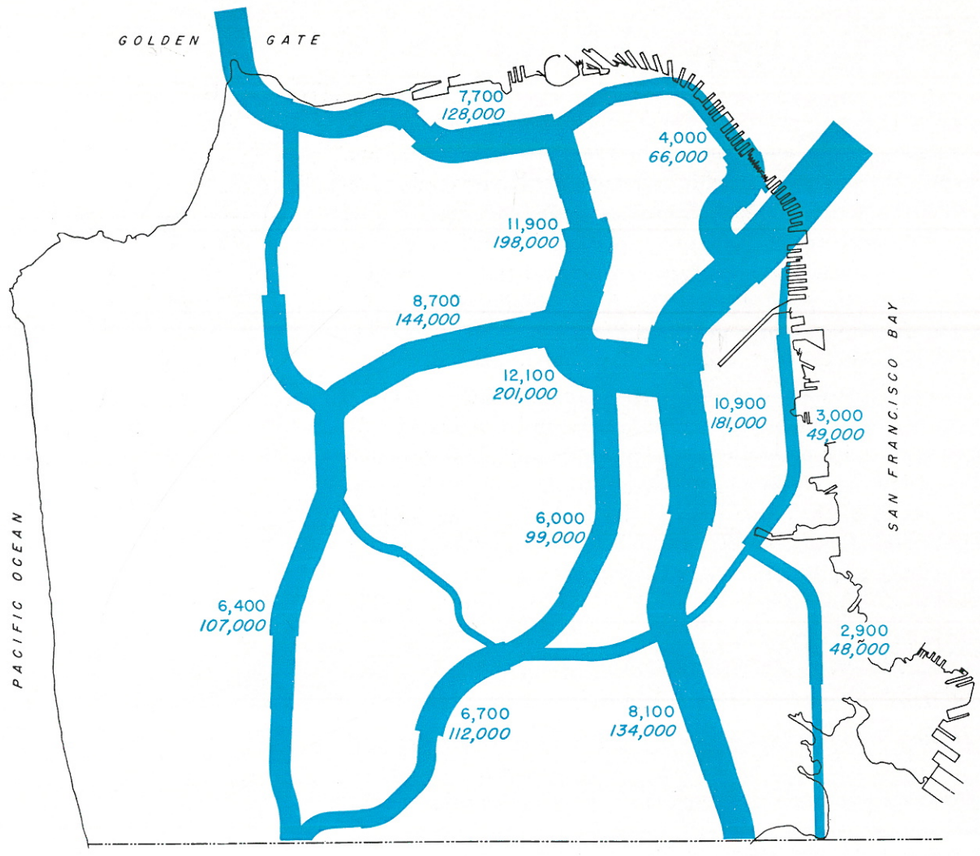
Network 80 would come closest to providing adequate capacity for anticipated 1975 traffic volumes of any of the networks analyzed. Congestion on the James Lick Memorial Freeway would be greatly relieved. Between the three parallel eastern freeway routes—the Embarcadero-Southern, the James Lick and the Mission Freeways—there would be a slight excess of total freeway capacity over freeway traffic demand for the three routes counted together if rapid transit were in operation. Major city streets parallel to these freeways would provide considerable additional excess capacity. Network 80 would reduce traffic pressures on the Market-Portola route and on the Western Freeway. Congestion in the Western Addition corridor, however, would be about the same as it would be in Network 10. As with all of the networks analyzed, the Central Freeway would have as much as a 50 per cent overload.



Peak Hour Traffic Volume Scale
15,000
10,000
5,000

Traffic Volume on Freeway
Diversion to Rapid Transit
999 Peak Hour Volume on Freeway
999 Average Daily Volume on Freeway

PROJECTED 1975 TRAFFIC VOLUME WITH RAPID TRANSIT



Peak Hour Traffic Volume Scale
15,000
10,000
5,000

999 Peak Hour Volume on Freeway
999 Average Daily Volume on Freeway

PROJECTED 1975 TRAFFIC VOLUME WITHOUT RAPID TRANSIT

TRAFFIC DEFICIENCY OR SURPLUS

Comparison of Practical Capacity of Traffic Corridors in Network 80 with Predicted 1975 Traffic Volumes

CORRIDOR	ROUTE	Number of Lanes Each Direction	DEFICIENCY OR SURPLUS FOR 1975, IN VEHICLES PER DAY*			
			If Rapid Transit Operative	Corridor Total	If No Rapid Transit	Corridor Total
Third Street Corridor	Southern-Embarcadero Freeway Extensions Third Street	4 3	+ 71,000 + 18,000	+ 89,000	+ 54,000 + 16,000	+ 70,000
Bayshore Corridor	James Lick Freeway Bayshore Boulevard	4 3	- 52,000 + 16,000	- 36,000	- 81,000 + 17,000	- 64,000
Bernal Corridor	Mission Freeway Mission Street, San Jose Avenue, etc.	3 4	- 17,000 + 23,000	+ 6,000	- 18,000 + 23,000	+ 5,000
SUBTOTAL, Third, Bayshore and Bernal Corridors				+ 59,000		+ 11,000
Twin Peaks Corridor	Market-Portola and parallel Streets	4	+ 7,000	+ 7,000	+ 7,000	+ 7,000
Panhandle Corridor	Western Freeway Fell-Oak, Fulton and parallel Streets	4 8	- 40,000 + 47,000	+ 7,000	- 48,000 + 49,000	+ 1,000
Western Addition Corridor	Geary Boulevard, Post, Sutter, Pine, Bush and California Streets	7	- 53,000	- 53,000	- 48,000	- 48,000
Marina Corridor	Golden Gate Freeway Marina Boulevard, Lombard and parallel Streets	3 8	- 37,000 + 46,000	+ 9,000	- 54,000 + 46,000	- 8,000
	TOTALS		Freeways - 75,000 Streets +104,000	+ 29,000	Freeways - 147,000 Streets + 110,000	- 37,000

*AT CORDON LINE AT ARMY STREET AND FILLMORE STREET "+" MEANS THAT CAPACITY EXCEEDS TRAFFIC VOLUMES "-" MEANS THAT CAPACITY IS LESS THAN TRAFFIC VOLUMES

NETWORK ANALYSIS

To compare properly the five freeway networks described in the previous section, additional factors need to be analyzed and evaluated. These include tangible or quantitatively measurable factors, such as assessed values of properties needed for rights-of-way, number of parcels and buildings required and their principal uses. Other tangible factors are the decreased overall traffic congestion that is foreseen, the greater safety associated with the use of grade-separated freeways, and the predicted benefits to users of freeways resulting from lower vehicle operating costs and shorter travel times.

In addition to the factors that can be evaluated in terms of quantities, there are the intangible factors which can be evaluated only with the application of subjective judgment. Intangible factors that must be weighed in evaluating these five networks include their possible effects on nearby properties and on the districts through which they pass, on individuals displaced, upon community development and amenities, and upon the appearance of the city.

TANGIBLE FACTORS

Costs and Right-of-Way Requirements

In the accompanying tables are statistical comparisons of tangible factors which have been developed from the studies of the alternate networks, their estimated costs, rights-of-way that would be needed and their assessed value, and the predicted volumes of traffic that would be attracted to their use, with attendant savings in time and reductions in accidents and reduction in congestion and hazard on city streets.

Benefits Derived From Freeways

In discussions of the effects of freeways on communities, neighborhoods, and abutting properties, it is generally conceded that freeway users will derive benefits from faster travel times. What is often overlooked is the benefit the freeways will provide through 1. reduced congestion and reduced volumes of traffic on city streets, 2. decreased city-wide accident rates because of traffic diversion to the safer freeways, 3. lower vehicular operating costs on freeways because the diversion of traffic reduces congestion, and 4. benefits to neighborhoods from local use of freeways in daily trips around the city.

Greater Safety from Use of Freeways

Studies made for this report show that accident rates in San Francisco are 5.6 times higher on city streets than on freeways. Personal injury and fatal accidents occur with 3.6 times the frequency (on a per vehicle-mile basis) on streets as on freeways. Studies over a period of twenty years, including experience in San Francisco, have proven the consistently better safety record of the freeways. Separation of opposing traffic streams, lack of grade crossings, de-

ESTIMATED COSTS OF FREEWAY NETWORKS

	Network 10	*Network 30*	*Network 40*	*Network 50*	*Network 80*
Length	13.0 miles	10.2 miles	11.0 miles	17.6 miles	15.8 miles
TOTAL COSTS	$289,000,000	$321,000,000	$262,500,000	$328,000,000	$348,000,000
Network Rank	(2)	(3)	(1)	(4)	(5)
Right-of-Way Costs	$ 69,500,000	$ 35,500,000	$ 55,500,000	$ 43,500,000	$ 89,500,000
Network Rank	(4)	(1)	(3)	(2)	(5)
Construction Costs	$219,500,000	$285,500,000	$207,000,000	$284,500,000	$258,500,000
Network Rank	(2)	(5)	(1)	(4)	(3)

ASSESSED VALUE OF PROPERTY NEEDED FOR RIGHTS-OF-WAY OF NETWORKS

	Network 10	*Network 30*	*Network 40*	*Network 50*	*Network 80*
Assessed Value of Parcels in Right-of-Way	$ 13,569,000	$ 7,047,000	$ 10,752,000	$ 6,958,000	$ 16,376,000
Network Rank	(4)	(2)	(3)	(1)	(5)

LAND AND BUILDINGS NEEDED FOR RIGHTS-OF-WAY OF NETWORKS

	Network 10	*Network 30*	*Network 40*	*Network 50*	*Network 80*
TOTAL PARCELS NEEDED FOR RIGHT-OF-WAY	1,784	1,163	1,370	1,177	2,206
Network Rank	(4)	(1)	(3)	(2)	(5)
Improved Parcels	1,709	1,114	1,316	1,149	2,114
Residential Parcels	1,462	946	1,116	1,023	1,726
Single-Family	(570)	(328)	(424)	(431)	(636)
Multiple	(892)	(618)	(692)	(592)	(1,090)
Commercial & Industrial	234	157	187	115	369
Institutional	13	11	13	11	19
Unimproved Parcels	66	43	47	27	82
City-Owned Parcels	9	6	7	1	10
TOTAL DWELLING AND BUSINESS UNITS	5,241	3,805	4,342	3,225	6,290
Network Rank	(4)	(2)	(3)	(1)	(5)
Dwelling Units	4,893	3,568	4,056	3,138	5,735
Business Units	316	214	261	82	521
Rooming Houses	19	14	12	5	19
Hotels	13	9	13	—	15

nial of access to pedestrians, lack of driveway entrances and absence of parking all contribute to this safety record. Since many street accidents involve pedestrians, non-motorists also derive benefits from safety increments attributable to traffic diversions from streets to freeways, as do property owners fronting on streets where this diversion reduces congestion and accident hazard. The net reduction in the city-wide accident rate is proportional to the extent that traffic is diverted to freeways. The estimates of such reduction are shown in the accompanying table. Network 80, providing freeway service to most parts of the city, would involve the greatest net reductions, and Network 30 with the least mileage, the least.

Time Saved by Use of Freeways

Typical speeds on city streets range from 13 to 32 miles per hour, while on freeways they range from 35 to 55 miles per hour. Most freeway users would save considerable time in their daily trips around the city. The extent of such time savings by the alternate networks would depend upon their accessibility for typical daily trips and the extent to which their routing and travel times provided advantages over major street corridors. The predicted ranking of the networks is shown on the table on this page.

Local Use of Freeways

One measure of the benefits of any proposed transportation facility is the degree to which it would serve San Francisco residents. This is indicated in the accompanying table, *Benefits to Freeway Users*. Network 30, which has the least freeway mileage of the five alternates, and Network 50, which has considerable mileage but circuitous routing for many traffic stream movements, show to disadvantage.

Network Traffic Capacities vs. Predicted Traffic Volumes

In the accompanying table is shown a tabulation of network traffic deficiency data found on pages 30 through 41, indicating the degree to which the networks could accommodate traffic that would be attracted to them, and the degree to which congestion on parallel city street corridors would be relieved.

Although all networks show a peak hour traffic demand in excess of the practical capacity of some of their elements, there would be excess capacity on the major street corridors. Much of the "freeway demand" traffic would actually use the less congested major streets, thus achieving a balance in total peak hour movements. Where there is a net deficiency for both freeways and city streets in a traffic corridor serving a particular sector of the city, serious congestion will occur on both the freeway system and the major street system. From the table it can be seen that Networks 10 and 80 show to advantage on system-wide traffic conditions, and indicate net peak hour capacity surpluses for five out of seven major corridors, while Networks 30 and 50 indicate deficiencies in four out of the seven corridors, as well as ranking lower on system-wide conditions.

BENEFITS TO FREEWAY USERS

*Savings in Time, Reduction of Accidents, and Utilization of Freeways for Local Trips as Predicted for the Alternate Networks in 1975**

	Network 10	*Network 30*	*Network 40*	*Network 50*	*Network 80*
TIME SAVED BY FREEWAYS					
Net Daily Vehicle-Hours Saved by Use of Freeways	22,500	12,800	27,600	14,700	23,600
Network Rank	(3)	(5)	(1)	(4)	(2)
NET ANNUAL REDUCTION IN ACCIDENTS					
Property Damage Accidents	2,795	2,135	2,850	2,750	3,045
Injury Accidents	1,228	920	1,279	1,190	1,320
Fatal Accidents	15	12	16	15	16
Network Rank	(3)	(5)	(2)	(4)	(1)
LOCAL USE OF FREEWAYS					
Daily Trips Utilizing Freeways Having One End in Residential District in San Francisco	172,000	119,000	172,000	45,000	204,000
Network Rank	(2)	(3)	(2)	(4)	(1)

*These predicted benefits are in addition to those that will be derived from use of Network 60, the presently authorized freeway system, which should be in operation by 1975.

NETWORK TRAFFIC CAPACITIES VS. PREDICTED 1975 TRAFFIC DEMAND, ASSUMING RAPID TRANSIT

	Network 10	*Network 30*	*Network 40*	*Network 50*	*Network 80*
Total Net Capacity vs. Demand for Freeways & Major Streets	+ 13,000	— 80,000	— 4,000	— 74,000	+ 29,000
Network Rank	(2)	(5)	(3)	(4)	(1)
Capacity vs. Demand for Network Freeways	—102,000	—170,000	— 64,000	—153,000	— 75,000
Network Rank	(3)	(5)	(1)	(4)	(2)
Capacity vs. Demand for Major City Streets	+115,000	+ 90,000	+ 60,000	+ 79,000	+104,000
Network Rank	(1)	(3)	(5)	(4)	(2)
Net Capacity vs. Demand for Freeways & Major Streets in Major Travel Corridors:					
1. *Third Street*	+ 89,000	+ 85,000	+ 89,000	+ 83,000	+ 89,000
Network Rank	(1)	(2)	(1)	(3)	(1)
2. *Bayshore*	— 92,000	— 79,000	— 92,000	—115,000	— 36,000
Network Rank	(3)	(2)	(3)	(4)	(1)
3. *Bernal*	+ 28,000	+ 30,000	+ 28,000	+ 35,000	+ 6,000
Network Rank	(3)	(2)	(3)	(1)	(4)
4. *Twin Peaks*	+ 1,000	+ 9,000	+ 1,000	— 8,000	+ 7,000
Network Rank	(3)	(1)	(3)	(4)	(2)
5. *Panhandle*	+ 1,000	—101,000	— 22,000	— 37,000	+ 7,000
Network Rank	(2)	(5)	(3)	(4)	(1)
6. *Western Addition*	— 26,000	— 7,000	— 26,000	— 46,000	— 53,000
Network Rank	(2)	(1)	(2)	(3)	(4)
7. *Marina*	+ 12,000	— 17,000	+ 18,000	+ 14,000	+ 9,000
Network Rank	(3)	(5)	(1)	(2)	(4)

"+": Capacity in Excess of Volumes, Vehicles per Day
"—": Capacity Less than Volumes, Vehicles per Day

INTANGIBLE FACTORS

Effect on Adjacent Property

On pages 19 and 20 it is shown that in studies of four California suburban freeways, subdivision sales and resales records gave little evidence of any marked effect on residential property market values because of proximity to a freeway. In San Francisco, a survey showed that freeway frontage properties fared slightly better in resale prices than similar parcels away from the freeway. There is general recognition that freeways have some degree of impact on the appearance and visual amenities of the districts traversed, and that this differs with freeways of different design characteristics.

This is illustrated by advocacy by many citizens and public officials of tunnels for freeways and subways for rapid transit as well as by the adverse public reaction to existing double deck elevated freeways. A general scale of preference for freeway types can be developed on the general premise that landscaped park-like routes are preferable to narrow routes within retaining walls; that elevateds are acceptable in industrial areas but less so in residential or shopping areas, and that single deck elevateds are more acceptable than double deck structures but that depressed routes are preferred over either.

From these observations an "Index of Freeway Effect upon Community Appearance" was constructed, with the standard being a freeway in tunnel or subway having a penalty point of one unit per mile of route. Other types of construction have higher penalty scores, depending on a subjective estimate of impact per mile and relative public acceptance.

The greatest number of penalty points was given to Network 80, with all the others having appreciably lower scores. The additional mileage of single deck elevated structure involved in the Mission Freeway, which is not in the other networks, accounted for much of Network 80's higher number of penalty points. Network 30's lowest score is accounted for by its lower total route mileage, and its higher proportion of tunnels and subways to total mileage. Network 50 scored in the same general range as Networks 10 and 40.

INDEX OF FREEWAY EFFECT ON COMMUNITY APPEARANCE

	Penalty Points Per Mile	*Network 10*		*Network 30*		*Network 40*		*Network 50*		*Network 80*	
		Miles	*Penalty Points*	*Miles*	*Penalty Points*	*Miles*	*Penalty Points*	*Miles*	*Penalty Points*	*Miles*	*Penalt Points*
TUNNEL OR SUBWAY	1	3.4	3.4	4.4	4.4	3.4	3.4	4.2	4.2	3.4	3.4
FREEWAY AT GRADE: In Permanent Open Spaces or Industrial Districts	2	—	—	—	—	—	—	2.8	5.6	—	—
DEPRESSED WITH LANDSCAPED SLOPES	2	2.3	4.6	1.4	2.8	1.4	2.8	4.3	8.6	3.5	7.0
DEPRESSED AND PARTIALLY ROOFED BY CANTILEVER: Vertical Retaining Walls	3	—	—	—	—	—	—	3.5	10.5	—	—
DEPRESSED WITH VERTICAL RETAINING WALLS	4	4.3	17.2	2.7	10.8	3.2	12.8	1.9	7.6	4.3	17.2
ELEVATED STRUCTURE, SINGLE DECK, OR ELEVATED FILL: In Industrial Districts	4	1.2	4.8	0.5	2.0	1.2	4.8	—	—	1.2	4.8
ELEVATED FILL, LANDSCAPED: In Residential and Shopping Districts	6	0.3	1.8	—	—	0.3	1.8	—	—	0.3	1.8
FREEWAY AT GRADE: In Residential and Commercial Districts	7	—	—	—	—	—	—	—	—	—	—
ELEVATED STRUCTURE DOUBLE DECK: In Industrial District	8	0.3	2.4	—	—	0.3	2.4	—	—	0.3	2.4
ELEVATED STRUCTURE, SINGLE DECK: In Residential and Commercial Districts	10	1.0	10.0	1.0	10.0	1.0	10.0	0.9	9.0	2.6	26.0
ELEVATED STRUCTURE, DOUBLE DECK: In Residential and Commercial Districts	20	0.2	4.0	0.2	4.0	0.2	4.0	—	—	0.2	4.0
TOTAL FOR NETWORKS — Mileage		13.0		10.2		11.0		17.6		15.8	
Penalty Points			48.2		34.0		42.0		45.5		66.6
Network Rank			(4)		(1)		(2)		(3)		(5)
PENALTY POINTS PER MILE			3.7		3.3		3.8		2.6		4.2
Network Rank			(3)		(2)		(4)		(1)		(5)

Index of Right-of-Way Acquisition Impact

To compare the effect of acquisition of right-of-way for freeways, it was assumed that the effect is not identical for each occupant of property involved. Thus, to compare the effects of the alternate networks, an index of relative values was evolved in which the following values were assumed:

1. Effect of displacement from right-of-way acquisition is half as great upon apartment dwellers as upon occupants of single-family homes. In comparison with a single-family dwelling, an apartment unit is usually occupied by a smaller, more mobile family which has little in the way of noncompensable investments and whose community roots are usually not as deep.
2. Displacement of a business is equal to displacement of a single-family dwelling in the effect on the businessman and his patrons.
3. Three thousand square feet of park land acquired is equal to one single-family home on the basis that acquisition of park land for freeway rights-of-way involves a loss of community recreational facilities and a potential replacement need.

Local Use of Freeways vs. Right-of-Way Acquisition Factor

The concept of a right-of-way index factor presented above provides a weighted total of single-family dwelling units, apartment units, business units, and units of park land needed for rights-of-way. Under the benefit-cost ratio concept this is considered an indication of the cost to the community. The utilization of freeways for local San Francisco trips is considered as an indication of community benefit.

Estimated User Benefits vs. Network Costs

To compare the costs of the alternate networks with the total estimated savings to users over a twenty-year period, estimated savings in operating costs on a per mile basis were computed, as well as savings through reductions in costs of accidents and savings from reduced travel time on an empirical time-value factor.

Operating cost savings are most apparent to the individual, but reduced insurance rates from reduced accidents will also be realized. Savings from reduced travel time result in increases in values of property where the transportation-proximity factor has a beneficial effect.

INDEX OF RIGHT-OF-WAY ACQUISITION FACTORS

Displaced Units	*Network 10*	*Network 30*	*Network 40*	*Network 50*	*Network 80*
Single-Family Homes	570	328	424	431	636
Apartment Units (Units × ½)	2,161	1,620	1,816	1,353	2,549
Business Units, Hotels, Rooming Houses	348	237	286	151	555
*Park Land (Per 3,000 sq. ft.)	270	—	—	1,170	270
Total Network Index Units	3,349	2,185	2,526	3,105	4,010
Network Rank	(4)	(1)	(2)	(3)	(5)

*This concerns the utilization of the central portion of seven and one-half blocks of a parkway strip for a freeway right-of-way to replace Park-Presidio Boulevard (Networks 10, 50, and 80), and sixteen and one-half blocks of a parkway strip for a freeway right-of-way to replace Sunset Boulevard (Network 50).

RATIO OF LOCAL USE OF FREEWAYS TO RIGHT-OF-WAY ACQUISITION FACTOR

	Network 10	*Network 30*	*Network 40*	*Network 50*	*Network 80*
Right-of-Way Acquisition Factor Units	3,349	2,185	2,526	3,105	4,010
Local Trips that Would Utilize Networks	172,000	114,000	172,000	45,000	204,000
Ratio: Local Trips to Right-of-Way Factor	51.4	52.2	68.1	14.5	50.9
Network Rank	(3)	(2)	(1)	(5)	(4)

RATIO OF ESTIMATED USER BENEFITS TO NETWORK COSTS

Estimated Cost of Right-of-Way and Construction vs. Estimate of Savings Accruing to Users of Freeways and City Streets from (1) Decreased Travel Time, (2) Reduced Accidents, and (3) Lower Vehicle Operating Costs over a 20-Year Period.

	Network 10	*Network 30*	*Network 40*	*Network 50*	*Network 80*
Cost of Network	$289,000,000	$321,000,000	$262,500,000	$328,000,000	$384,000,000
Value of User Benefits Over a 20-Year Period	$246,000,000	$228,000,000	$328,000,000	$270,000,000	$388,000,000
Ratio: User Benefit to Cost	0.85	0.71	1.25	0.82	1.01
Network Rank	(3)	(5)	(1)	(4)	(2)

SUMMARY OF FREEWAY NETWORKS ANALYSES

Network 10:

Would provide most relief for major streets.
Ranks high in providing adequate net traffic capacity for freeways and streets.
Ranks second in local freeway use.
Would be next to the least expensive network.
Would require next to the highest amount of assessed value of right-of-way, number of dwelling units.
Would rank in fourth place on the right-of-way acquisition index and community appearance index.

Network 30:

Would involve the lowest mileage of new freeway construction.
Would have the highest construction cost.
Would have the lowest right-of-way cost.
Would require the fewest parcels of land, and the fewest buildings and dwellings.
Would have least adverse effect on community appearance.
Would involve the least time-savings to freeway users.
Would result in the least reduction of accidents.
Would least accommodate 1975 traffic demands.
Would be second best in ratio of local freeway use to right-of-way impact.

Network 40:

Would be least expensive network.
Would provide greatest user time savings.
Would have best capacity to handle 1975 freeway traffic demand.
Ranks second in accident reduction and local use of freeways.
Ranks second in indices of right-of-way acquisition factors and effect on community appearance.
Ranks first in ratio of user benefits to cost and in ratio of local use of freeways to right-of-way factors.

Network 50:

Would have the second highest construction costs.
Would add the greatest mileage of new freeways.
Would have the second lowest right-of-way cost.
Would have the lowest total assessed value of parcels to be acquired.
Would displace the least number of dwelling and business units.
Ranks fourth in freeway capacity for 1975 traffic demand, relief of traffic congestion on city streets, time saved, accidents reduced, and local use of freeways.
Ranks third in indices of right-of-way factor and freeway effect on community appearance.
Ranks next to last in ratio of user benefits to cost and last in ratio of local use of freeways to right-of-way factor.

Network 80:

Would be the most expensive network.
Would have the highest right-of-way cost.
Would require the most parcels for right-of-way and would displace the greatest number of dwelling and business units.
Would rank last on the indices of right-of-way factors and effect on community appearance.
Would provide the best net traffic capacity for freeways and major streets to meet the 1975 traffic demands.
Would rank second for predicted freeway capacity.
Would result in the greatest reduction in accidents and local use of freeways.
Would rank second on the ratio of user benefits to costs.
Would rank fourth on the ratio of local use of freeways to right-of-way factor.

Network 80, the 1951 Trafficways Plan, ranks high on user benefit factors, but poorly on all of the factors related to effects on property. The contrast is also present to a less marked degree in Network 10. Network 40 occupies a middle position in its ranking on both user benefit and property related factors. Networks 30 and 50 tend to score low on user benefits and high on property considerations.

These patterns reflect the fact that the Trafficways Plan of 1951 was specifically designed to answer the needs of the then predicted future traffic needs for 1970 which, except for being more conservative, are not radically different from current predictions for 1975. Networks 30 and 50 were both specifically designed to avoid the taking of property wherever possible, and so other factors may have been subordinated to this objective.

RANK OF FREEWAY NETWORKS BASED ON VARIOUS PLANNING FACTORS

Planning Factor	*Network 10*	*Network 30*	*Network 40*	*Network 50*	*Network 80*
Factors of Concern to the Community & Property Owners					
Total Project Costs	2	3	1	4	5
Assessed Value of Rights-of-Way	4	2	3	1	5
Number of Dwelling Units Displaced	4	2	3	1	5
Index of Right-of-Way Acquisition Factors	4	1	2	3	5
Index of Freeway Effect on Community Appearance	4	1	2	3	5
Benefits to Users of Freeways & Major Streets					
Total Net Traffic Capacity, Freeways plus Streets	2	5	3	4	1
Freeway Traffic Capacity	3	5	1	4	2
Major Streets Traffic Relief	1	3	5	4	2
Time Saved	3	5	2	4	2
Accidents Prevented	3	5	2	4	1
Local Use of Freeways	2	3	1	4	1
Benefit-Cost Ratios					
User Benefit to Cost	3	5	1	4	2
Local Trips to Right-of-Way Factor	3	2	1	5	4

CHOICE OF ROUTES

The five alternate networks have been analyzed and compared as entire networks. The desirability of constructing a recommended program out of elements from different networks becomes evident as their ratings are compared and the conclusion is reached that no one network is outstanding on all points. The various routes serving the southeastern, southwestern and northern sectors of the city are reviewed and the recommended plan is outlined below.

SOUTHEASTERN SECTOR

In the southeastern sector, the important route choices have already been approved in general by the Board of Supervisors and the State legislature. The route for the Southern Freeway and its extension has been adopted by the State Highway Commission. Specific location of the Embarcadero Freeway extension from Howard Street to Evans Avenue is now under study. Preliminary studies are being made by the State Division of Highways for the location of the Hunters Point Freeway.

SOUTHWESTERN SECTOR

To serve the southwestern sector, there are three route choices:

The Sunset Freeway as outlined in Network 50, with its connections to the Central Freeway via the Lincoln-Fulton Freeway and the Panhandle section of the Western Freeway.

The Western Freeway as outlined in Network 10.

The Mission Freeway as described in Network 80, to connect the Southern Freeway with the Central Freeway.

Two of these routes, the Western Freeway and the Sunset-Lincoln-Fulton combination, would serve the southwestern part of the city and would extend from the Central Freeway to the county line. The Mission Freeway would connect with the Southern Freeway to reach the county line and would be of insignificant service to the West of Twin Peaks and Sunset districts in the southwest sector.

The Western Freeway would be the most expensive to build, costing $11,000,000 more than the Sunset-Lincoln-Fulton route. The reduction in the assessment roll would be about the same for both routes. The Western would have less freeway mileage than the Sunset and would also be much more direct in its route. The Western would remove congestion from major city streets in 1975, whereas the Sunset-Lincoln-Fulton route would leave net capacity deficiencies in the Twin Peaks and Panhandle corridors because of its indirect routing for most residents of southwestern San Francisco and for the residents of northwestern San Mateo County. Community appearance penalty points are almost twice as great for the Sunset route, because of its greater mileage, as for the Western.

The Mission Freeway, because it would utilize the Southern Freeway to reach the southwest gateway at the county line, would be the most economical of the three routes. Although its initial cost would amount to about one-third as much as either of the others, its reduction of the assessment roll would be about two-thirds as great and it would involve the dislocation of nearly twice the number of business properties.

The Mission Freeway would concentrate freeway service in the southeastern sector, would provide only indirect service for the southwestern sector with practically none for the Sunset and West of Twin Peaks districts, and would do little or nothing towards reducing the deficiencies of the Twin Peaks and Panhandle traffic corridors where serious congestion would develop.

From the standpoint of possible community impact, the following points were considered in reviewing the Western Freeway:

1. South of Ocean Avenue the existing Junipero Serra Boulevard can be converted into a freeway with little taking of property. Properly designed and landscaped, it can be made as attractive as the present boulevard and with overcrossings it would be less of a traffic barrier.

2. The subway under Junipero Serra Boulevard from Ocean Avenue to St. Francis Circle will relieve present local traffic congestion on the surface.

3. The long tunnel from Wawona Street to Laguna Honda Boulevard will minimize the taking of residential properties.

4. Tunnels under Golden Gate Park will avoid interference with park uses.

On the basis of the foregoing considerations the Western Freeway appears in the most favorable light to serve the southwestern sector.

COMPARISON OF ROUTE CHOICES IN SOUTHWESTERN SECTOR

	Sunset Freeway	*Western Freeway*	*Mission Freeway*
Length	14.5 miles	7.1 miles	2.8 miles
TOTAL COST	$162,000,000	$173,000,000	$ 59,000,000
Construction	131,500,000	144,500,000	39,000,000
Right-of-Way	30,500,000	28,500,000	20,000,000
ASSESSED VALUE OF RIGHT-OF-WAY	$ 3,954,000	$ 4,027,000	$ 2,807,000
TOTAL PARCELS IN RIGHT-OF-WAY	867	886	42
Single-Family	364	371	6
Multiple-Family	396	409	19
Commercial	79	62	13
Other	28	44	2
CAPACITY OF FREEWAYS & MAJOR STREETS, 1975, ASSUMING RAPID TRANSIT	*Vehicles Per Day*		
Third-Bayshore-Bernal Corridors	+ 3,000	+ 15,000	+ 49,000
Twin Peaks Corridor	− 8,000	+ 1,000	− 15,000
Panhandle Corridor	− 37,000	+ 1,000	− 38,000

+ Net Surplus — Net Deficiency

TYPE OF FREEWAY STRUCTURE	*Penalty Points Per Mile*	*Miles*	*Penalty Points*	*Miles*	*Penalty Points*	*Miles*	*Penalty Points*
Tunnel or Subway	1	2.6	2.6	2.8	2.8	—	—
Freeway at Grade, Open Areas	2	2.8	5.6	—	—	—	—
Depressed, Landscaped Slopes	2	3.4	6.8	1.4	2.8	1.2	2.4
Depressed, Cantilevered	3	3.5	10.5	—	—	—	—
Depressed, Retaining Walls	4	1.6	6.4	1.9	7.6	—	—
Elevated Fill, Residential District	6	—	—	0.3	1.8	—	—
Elevated, Single Deck, Residential or Commercial District	10	0.6	6.0	0.7	7.0	1.6	16.0
Total		14.5	37.9	7.1	22.0	2.8	18.4

NORTHERN SECTOR

The route choices to be considered in the city's northern sector are:

The Golden Gate Freeway and the Central Freeway
The Pacific Heights Tunnel
The Presidio Heights Tunnel
The Park-Presidio Freeway

The Golden Gate Freeway and the Central Freeway are described in Networks 10 and 80.

The Presidio Heights Tunnel route would utilize an extension of the present Central Freeway north across Van Ness Avenue to ramps at O'Farrell and Post Streets and would be used in combination with the Russian Hill Tunnel. Since the Park-Presidio Freeway is described in Networks 10, 50 and 80, it is not included in the following table.

The most expensive route would be the 2.2-mile-long Pacific Heights Tunnel with tunnel ramp connections to Bush and Pine Streets. The 3.7-mile Presidio Heights route would cost the same as the 5.0 miles of route in the Golden Gate and Central Freeways.

Assessed value of property needed for the Central and Golden Gate Freeways would be over three times that of any of the other alternates. About twice as many parcels of property and about twice as many dwelling units and business properties would be taken. The Pacific Heights Tunnel would take fewer properties than any other route because seven-tenths of its length is in tunnel.

On traffic service and net capacity of freeways and major streets, the Golden Gate and Central Freeways combination shows to considerable advantage. It would also provide service to the largest area of the northern sector and the most direct route for northern sector residents to desired destinations downtown, in the Civic Center or along The Embarcadero. The Presidio Heights Tunnel with its conveniently located Geary-Presidio interchange would serve the Western Addition better than would the Pacific Heights Tunnel with its connections to Pine and Bush Streets which are now taxed to their capacity during peak hours.

The Pacific Heights Tunnel, on the other hand, would serve the Marina better than the Presidio Heights Tunnel, because of its more direct routing to the Civic Center and downtown areas. However, undesirable delays, giving rise to congestion and hazard, could result from the merging of large volumes of traffic in its underground interchange.

Building the Presidio Heights Tunnel would require additional lanes on the Western Freeway from Baker Street to the Central Freeway. The Pacific Heights Tunnel would necessitate additional lanes on the existing Central Freeway.

The effect on community appearance is considerably greater for the Central-Golden Gate Freeway combination than for the

COMPARISON OF ROUTE CHOICES IN NORTHERN SECTOR

	Golden Gate & Central Freeways	*Pacific Heights Tunnel*	*Presidio Heights Tunnel, Short Central, Russian Hill Tunnel*
Length	5.0 miles	2.2 miles	3.7 miles
TOTAL COST	$114,000,000	$162,000,000	$114,000,000
Construction	73,000,000	149,000,000	98,000,000
Right-of-Way	41,000,000	13,000,000	16,000,000
ASSESSED VALUE OF RIGHT-OF-WAY	$ 9,542,000	$ 3,004,000	$ 3,120,000
TOTAL PARCELS IN RIGHT-OF-WAY	898	310	453
Single-Family	199	67	84
Multiple-Family	483	196	269
Commercial	169	36	82
Other	47	11	18
CAPACITY OF FREEWAYS & MAJOR STREETS, 1975, ASSUMING RAPID TRANSIT	*Vehicles Per Day*		
Panhandle Corridor	+ 1,000	− 37,000	− 101,000
Western Addition Corridor	− 26,000	− 46,000	− 7,000
Marina Corridor	+ 12,000	+ 14,000	− 17,000

+ Net Surplus — Net Deficiency

TYPE OF FREEWAY STRUCTURE	*Penalty Points Per Mile*	*Miles*	*Penalty Points*	*Miles*	*Penalty Points*	*Miles*	*Penalty Points*
Tunnel or Subway	1	0.6	0.6	1.6	1.6	1.6	1.6
Depressed, Landscaped Slopes	2	—	—	—	—	—	—
Depressed, Retaining Walls	4	2.5	10.0	0.3	1.2	1.1	4.4
Elevated, Single Deck, Industrial District	4	1.2	4.8	—	—	0.5	2.0
Elevated, Double Deck, Industrial District	8	0.2	1.6	—	—	—	—
Elevated, Single Deck, Residential or Commercial District	10	0.3	3.0	0.3	3.0	0.3	3.0
Elevated, Double Deck, Residential or Commercial District	20	0.2	4.0	—	—	0.2	4.0
Total		5.0	24.0	2.2	5.8	3.7	15.0

others, because of its greater mileage and lesser proportion of tunnel route. Part of the penalty points for all of the routes, except the Pacific Heights Tunnel route, comes from the extension of the Central Freeway north to O'Farrell and Post Streets as an elevated structure through a commercial district, a route that is considered necessary to carry traffic from the existing Central Freeway across Van Ness Avenue to major streets leading to the center of downtown.

The two tunnel routes have capacity deficiencies, indirect routing for important streams of traffic and incompatibility with future expansion of the freeway system. On the other hand the Golden Gate-long Central Freeways combination would displace an extremely high number of dwelling and business units per mile of route.

The combination of the Western Freeway, the Park-Presidio Freeway and the short Central Freeway as far as O'Farrell and Post Streets would provide a direct and continuous route from the Golden Gate Bridge to downtown, to residential and employment areas and to the Bay Bridge and to the Peninsula gateways. Inclusion of the Russian Hill Tunnel described in Network 30 would provide traffic relief for the Marina and for North Beach.

The short Central Freeway, Park-Presidio Freeway and Russian Hill Tunnel combination would have less capacity to carry 1975 traffic loads than the complete Golden Gate-Central Freeway route or either of the tunnel routes. However, the low investment and expandability of this combination would mean that capacity deficiencies could be corrected by adding to the system at a later date.

The short Central Freeway, Park-Presidio Freeway and Russian Hill Tunnel combination appears in the most favorable light because of the ease with which it can be expanded at a later date when the following uncertainties have been resolved:

1. The need for a second Bay crossing to Marin County.
2. The location of a second Marin crossing. If the Fort Mason site for the Tiburon Bridge were to be chosen, it might be found that either of the tunnel routes would not serve the newly created traffic movements. Additions, however, could be made to the short Central Freeway, Park-Presidio Freeway and Russian Hill Tunnel combination that would serve a second Marin crossing.
3. Approval of a Bay Area rapid transit system by the Boards of Supervisors of the five counties in the District and approval of a bond issue by its voters.
4. Inclusion of a line to Marin County in the Bay Area rapid transit system.

Short Central Freeway, Park-Presidio Freeway and Russian Hill Tunnel

Length	2.0 miles
TOTAL COST	$43,000,000
Construction	37,000,000
Right-of-Way	6,000,000
ASSESSED VALUE OF RIGHT-OF-WAY	$ 2,091,000
TOTAL PARCELS IN RIGHT-OF-WAY	137
Single-Family	12
Multiple-Family	59
Commercial	56
Other	10
CAPACITY OF FREEWAYS & MAJOR STREETS, 1975, ASSUMING RAPID TRANSIT	*Vehicles Per Day*
Panhandle Corridor	— 69,000
Western Addition Corridor	— 26,000
Marina Corridor	— 30,000

+ Net Surplus — Net Deficiency

THE RECOMMENDED PLAN

The recommended plan is primarily made up of the elements of Network 10 but excluding two freeway routes—the Central Freeway north of Post Street and the Golden Gate Freeway. It will provide the city with a freeway system of 32.2 miles of route, of which 23.1 miles are in the approved Network 60. The 9.1 miles of additional route proposed for construction will cost approximately $216,000,000 and will reduce the present assessment roll by less than one-half of one per cent. The elements of the recommended plan are:

1. Freeways in approved Network 60: the Southern, the Southern extension, the Embarcadero extension, the Hunters Point, the James Lick and the existing Central and Embarcadero Freeways.
2. The Western Freeway as set forth in Network 10.
3. The Park-Presidio Freeway as set forth in Network 10.
4. The extension of the Central Freeway to ramps at O'Farrell and Post Streets as set forth in Network 30.
5. The Russian Hill Tunnel route as set forth in Network 30.

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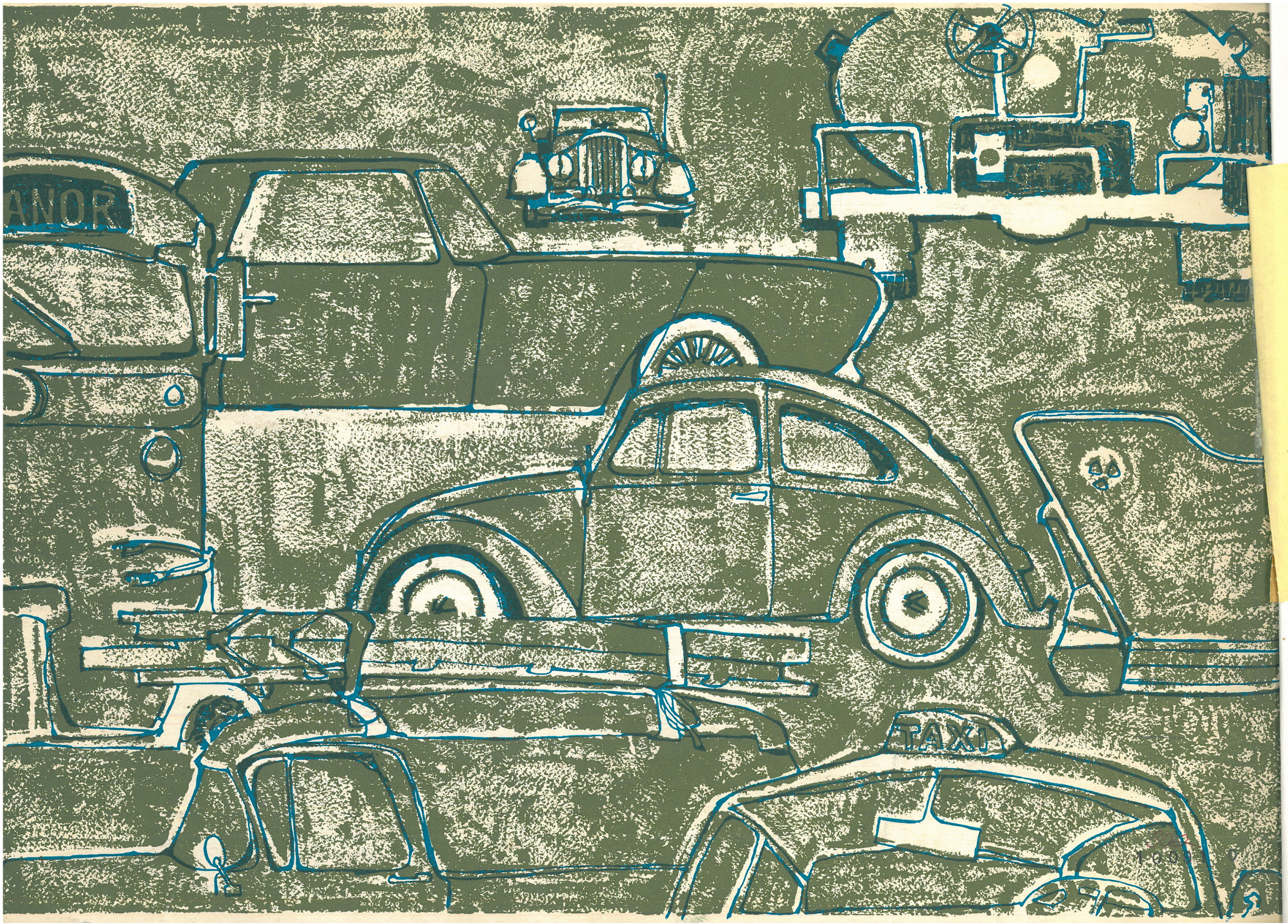
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